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BASIC SKILLS RESOURCE CENTER:

Teaching Reading Comprehension To Adults in Basic Skills Courses

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University of California at Los Angeles

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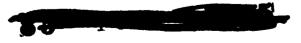Instructional Technology Systems Technical Area
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20. ABSTRACT *(Continue on reverse side If necessary and identify by block number)*

In a series of three research efforts, three written curricula and one micro-
computer-assisted curriculum were developed and used in order to teach reading
comprehension to soldiers in Basic Skills classes on four Army bases. Compared
with a control Basic Skills class, and with pretests, the experimental curric-
ula, using readings selected primarily from Army manuals, increased reading
comprehension by 20 % in nine hours. The microcomputer-assisted instruction
reduced learning time from nine hours to five hours, a saving of 45 %.

18. (continued)

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Acknowledgements

Foreword

Illiteracy among young adults continues to be a major unsolved problem in modern America. Functional illiteracy among young adults in our technologically advanced 20th century society reduces job performance, limits educational opportunities, and retards the development of a healthy concept of self. In the military, literacy is important for success in war, where precise communication and the ability to read and understand language are critical, and also for success in learning during peacetime, when complex technological skills are acquired during weeks or months of study in specialized military training courses.

This research note reports on the success of attempts to teach marginally literate soldiers to increase quickly their ability to read Army texts, magazine articles, and newspaper reports with comprehension. The teaching procedures, written curriculum materials, and microcomputer-based curricula developed in these efforts make use of principles of generative learning which provide a new understanding of how to teach reading comprehension to marginally literate soldiers in regular basic skills classes.

Executive Summary

In a series of three studies conducted in Basic Skills classes taught at Ford Ord, Fort Irwin, Fort Hunter-Liggett, and Schofield Barracks, low reading ability soldiers regularly enrolled in Basic Skills classes learned in nine hours to increase their reading comprehension of Army manuals and texts as well as non-technical materials. The teaching procedures and curriculum materials developed and presented in this research project were based on the principles of generative learning developed by the author, which are that low ability readers need to learn (1) to relate sentences in Army manuals and texts to one another in an organized way, and (2) how to relate sentences in Army manuals and non-technical materials to their experience and knowledge.

In the first and second of the three studies, five different curricula, each using paragraphs from Army manuals and from magazines and newspapers, were used in Basic Skills classes. A comparable control group of soldiers given customary Army Basic Skills instruction, taught by regular Basic Skills teachers, and also offered on the same Army bases in the same classrooms for the same amount of classroom time, was used to evaluate the effectiveness of the new materials and teaching procedures. Pretests and posttests were also given to all experimental and control classes to provide a second measure of effectiveness of the experimental curricula and the generative teaching methods.

The soldiers in each of the experimental groups showed statistically significantly greater improvement in reading comprehension than did the soldiers in the control group. The second measure of effectiveness, the gains from the pretest to the posttest, also showed the same statistically

significant increase in reading comprehension only in the experimental treatments. The control treatment showed no gain.

In the third study in the series, the curricula and teaching procedures developed in the first and second studies were rewritten for use with microcomputers. The rewritten materials were presented in micro-computers to regularly enrolled Basic Skills (BSEP) students at Ford Ord and Fort Irwin. Statistically significant gains in improvement in reading comprehension again occurred. In addition, the time needed for the instruction dropped sizably, from an average of 450 minutes (nine 50-minute class hours) to an average of 251 minutes (about five 50-minute class hours).

The research indicates that reading comprehension can be sizably increased with some soldiers at no added cost using written materials in typical Basic Skills classes offered on Army bases by regularly employed BSEP teachers working with normally enrolled BSEP soldiers. Under these realistic and typical conditions, the reading comprehension instruction and curricula should teach soldiers how to generate meaning by relating their knowledge and background to the manuals and other texts they read, and by generating relations among the sentences in the text. These two basic principles can lead to inexpensive but useful modifications in teaching and to increases in ability to read with comprehension. The research also implies that with microcomputers and appropriate curricula, reading comprehension can be increased and training time can be markedly reduced, at least with some soldiers.

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TEACHING READING COMPREHENSION TO ADULTS IN BASIC SKILLS COURSES

The Problem

Many young adults in our society cannot read with comprehension. Their inability to understand adequately the words they read complicates their daily lives in profound ways. Some of these young people leave high school, occasionally elementary school, before graduation. In the job market, where they find themselves after leaving school, many of them face repeated rejection and frustration, especially for the positions they find attractive and stimulating.

The consequences of being a young adult unable to read with understanding in our society extend beyond the job market, and surpass the feelings and thoughts these comments can only suggest here. Imagine the effects of learning in your teens that all professions, nearly all businesses, and most occupations will remain permanently beyond one's grasp. Consider also that an inability to read with understanding induces a reluctance to marry and to have children. Marriage and a family entail personal relations and financial responsibilities that exceed one's ability to meet. Think also of the consequences of realizing that all knowledge and information stored in books, magazines, newspapers and letters will never be understood nor enjoyed.

Perhaps the most devastating result of the inability to read with comprehension is the cumulative effect upon one's self-concept of these occupational, social, and personal consequences. They lead to a feeling of helplessness and frustration, which often produces a feeling of hopelessness. We found these thoughts and feelings to occur commonly among the young adults with reading comprehension problems that we studied in the research summarized in this report.

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Some of these consequences of inability to read with understanding may be more perceived then real among the people we studied. Nonetheless, the problems are real to the people who perceive them. The problems also are part of the difficulty of teaching reading comprehension to young, marginally literate adults, who feel that they cannot, and will not ever, learn to read with understanding. Behind their pessimism is the awareness that since they were six years of age someone has been trying to teach them to read. No one has ever succeeded at it. As a result, they believe that for unknown reasons no one will ever teach them to read.

To teach reading comprehension to these young adults presents a formidable challenge to educators interested in cognitive and affective learning. Many of these learners have not developed learning strategies, study skills, and models of comprehension necessary for getting meaning by juxtaposing text and knowledge. Many of them do not use simple verbal or imagery strategies, control their attention, nor understand the active, generative nature of reading comprehension. For many of them comprehension means "memorizing the meanings of all the words in the sentences."

Their elementary model of reading comprehension contains a strong point. Vocabulary learning is critical for reading comprehension. But their model of reading comprehension is only the beginning of the complicated process of learning to read with understanding.

The Objective and the Method

In the research studies presented in this final report we facilitated reading comprehension among marginally literate army enlisted personnel. Our primary goal was, in a series of empirical studies with marginally

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literate soldiers on active duty, to design, write, use, and evaluate

teaching procedures and written curricula that enhance their reading

comprehension of text in Army manuals and in books and magazines. Our

written materials and teaching materials were designed for practical use

by teachers and students in Army basic skills classes, taught during

regular hours on several Army Bases that represented a variety of

student interests, backgrounds, and abilities. In addition, the

materials and the teaching methods were designed to teach reading

comprehension efficiently under severe time constraints. A total of

nine hours of classroom instruction time limited the length of the

remedial curriculum we designed.

Last, we wanted to develop and test the reading comprehension

materials and procedures under actual teaching conditions on Army Bases,

where soldiers and teachers face realistic day-to-day demands that

influence the nature and effectiveness of instruction. For this reason

we devoted considerable time, energy, and financial resources to contacting

Army Bases, gaining permission and access to reading classes on these

bases, traveling to five Army Bases, two of which were over one thousand

miles from UCLA, and none of which was located in the Los Angeles area,

and working on-site with the teachers, administrators, students, and

other Army personnel involved in the classes and in the instruction.

These expensive and time consuming data collection procedures

contributed immeasurably to the validity and utility of our instructional

materials and teaching materials. Our direct contact with the teachers

and students quickly taught us the reading interests and abilities of

the students, the needs of the military services, and the requirements

of the teachers and their supervisors. Although our studies lost some

of the advantages of control afforded by a laboratory, our curricula and teaching procedures gained a real-world validity and a vigorous test under actual conditions found on several Army Bases. As a result, these materials and procedures are useful for the Army, and they have been demonstrated to be effective on Army Bases under regular, everyday teaching conditions using Army-employed teachers and Army-selected students reading typical passages taken from books, magazines, and especially from Army Manuals.

The Theory and the Data-Base of the Project

In the preceeding section on the problem, we mentioned the short-comings of the "vocabulary learning" model of reading comprehension, commonly found among the soldiers we studied. They are not the only people who have had difficulty understanding the complexities of reading comprehension. Prior to the recent resurgence of interest in the cognitive processes of reading comprehension (Wittrock, 1981) teachers of reading also had little understanding of reading comprehension and few ideas about how to teach it.

Within the last twenty years, reading comprehension has increasingly become a focus of research on cognitive learning, knowledge acquisition, and students' thought processes. Within that focus, educational implications for facilitating reading comprehension acquired new importance and became a center of interest among researchers studying the cognitive processes of reading comprehension.

During the last twenty years, my students and I have studied the facilitation of reading comprehension. Our studies, all of which were experiments with random assignment of learners to treatments, consistently indicate that reading with comprehension is a generative process. From

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these research studies we have learned several important facts about the teaching of reading comprehension and about the nature, variety, and development of the generative processes of comprehension.

Classroom Studies

In several experiments (e.g., Doctorow, Wittrock, & Marks, 1978; Linden & Witrrock, 1981; Wittrock, Marks, & Doctorow, 1975) we have consistently improved reading comprehension among public elementary secondary school students by 25 to 100% with our instructional strategies. In these studies, time across the control and experimental treatments was always held constant, a variety of commonly employed commercially published reading materials was used, and our learning and instructional strategies were practical for use in the classroom.

In several studies we asked the learners to compose and to write a summary sentence for each paragraph they read. In other experiments we asked them to write paragraph headings, to draw simple diagrams, to relate the parts of the text to one another, to relate the text to their knowledge, or to think of and to write examples of the text, as they read it. These generative learning strategies regularly enhanced reading comprehension or retention by sizable amounts, without increasing the time given to the reading.

In one study of reading comprehension among sixth graders (Marks, Doctorow, & Wittrock, 1974), we hypothesized and found that sentence comprehension was markedly improved by substituting one high-frequency synonym per sentence for its low-frequency counterpart in the commercially published text. The effect occurred across all three levels of reading ability and with all different stories and tests used in the experiments.

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In another study (Wittrock, Marks, & Doctorow, 1975) of reading as a generative process, we predicted and found that a familiar story context sizably increased reading comprehension and the learning of undefined new vocabulary words. The students apparently generated the meanings of the words from the familiar story context, in accord with the model of generative learning. Again, the results occurred with all three levels of reading ability and with all stories and tests used in the experiment.

In a study of the effects of generating pictures upon vocabulary, Bull and Wittrock (1973) found that the drawing of simple diagrams by fifth graders facilitated their learning and retaining of the meanings of the vocabulary words, when compared with the copying of the verbal definitions of the words. When children are mature enough to construct imaginal representations of the words they read, these representations can facilitate their vocabulary learning.

A related effect occurs with verbal generations, and the size of the effect is sometimes large. In one set of three classroom experiments, Doctorow, Wittrock, and Marks (1978) asked 400 sixth graders to read stories from commercially published reading materials. Some groups of children were also given headings for the paragraphs of the stories. Other groups were asked to generate summary sentences for the paragraphs after they read them. Other groups were given paragraph headings and were asked to generate summary sentences for each paragraph. The model of generative learning predicted that the groups given the paragraph headings and asked to construct summaries should produce the highest comprehension followed, in turn, by the groups asked to generate summaries, the groups given the paragraph headings, and last, the control groups

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given only the same commercially published stories read by all the groups. The data closely agreed with these predictions. The group given the generative instructions and the paragraph headings doubled the comprehension and retention attained by the control groups. Time to learn was held constant across all experimental and control groups.

Linden and Wittrock (1981) developed an instructional sequence designed to teach reading comprehension according to Wittrock's model of generative learning. In the study, 58 ten-year-old school children were taught to construct imaginal and verbal elaborations as they read texts in their reading classes. Compared with a control group of school children given the same amount of time and given the same tests, the verbal and imaginal generations constructed by the children in the experimental group increased reading comprehension by about 50% of their pretest score.

From these classroom studies there is support for the hypothesis that reading comprehension and retention can be improved by inducing low- or high-ability learners to generate relations among the parts of the text or between the text and their experience and knowledge. Either the characteristics of the text, such as the frequency value of the words, its headings, or its familiarity, or the generative activities children are asked to perform upon it, such as to summarize it, construct a heading for it, or draw a picture of it, can be used to induce children to construct meaning as they read. The result is often an enhancement of reading comprehension and retention. For further discussion of these and related studies see the recent book on Pressley and Levin (1983a) especially Chapter 4 by Cook and Mayer.

These applied studies raise important questions about the processes of reading comprehension. Why are we more likely to comprehend sentences we generate or compose than sentences we read? How do the generative cognitive processes produce their effects upon comprehension? Do they increase effort, attention, or encoding?

Several laboratory studies, often with college students learning word lists and pairs, have investigated the generation effect and have tried to explain it.

Laboratory Studies

Wittrock and Carter (1975) gave college students hierarchially arranged words and asked the learners to process them generatively, that is, to relate them to one another and to construct the proper hierarchical relations among them. Whether the words were conceptually related to one another or were chosen at random from a dictionary, generative processing of them sizably increased, usually doubled, their retention.

In two experiments, Wittrock and Goldberg (1975) studied children's and college students' learning and memory of words they were asked to put into sentences, or into a story, or into an interactive image. The high-imagery words were best remembered by the adults and the children. The directions to group the words into stories, sentences, or images facilitated recall for the children but not for the adults. The results imply that the effectiveness of the directions depends upon the learner's developmental level and upon the cognitive processes they have learned to use. Instructional aids, such as these directions, can help learners only if they are not already spontaneously performing the generative activities mentioned in the instructions.

In three experiments with fourth and fifth graders, the type of instruction necessary to teach the children to learn and to transfer a simple concept depended upon the previously learned relevant concepts (Wittrock, 1978). When the training focused upon a relevant but not highly salient concept, transfer increased quickly and markedly.

In five experiments with college students, Slamecka and Graf (1978) compared memory for words that were read or were generated. In all measures in all five studies, the generation of words enhanced memory. The generation phenomenon held across different rules and materials, across timed or self-paced learning, and across different types of tests and different experimental designs.

In experiment three they tested selective attention as the sole explanation for the generation effect. The responses, which were generated, but not the stimuli, which were not generated by the learners, were better recognized later. If selective attention were the sole explanation of the generation effect, then the stimuli would have been as well recognized later as the responses, since the learners selectively attended to both of them. However, the data in their experiment five are less clear cut on this issue. From their data no firm conclusion is possible now on the role of attention in generation.

But the authors do conclude that their data eliminate overt responding, frequency, exercise, time to learn, and levels of processing as explanations of the generation effect. Distinctive encoding is still a possible explanation; so is effort.

Jacoby (1978) compared reading with generating solutions to simple word problems. Compared with reading the words, generating the response words increased their recall when the problems were seen only once

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earlier or were seen repeatedly in a spaced pattern. In massed practice, reading or generation made no difference in recall, apparently because massed practice trivializes generative reading. The learner can recall the answer directly from short-term memory. When the interval between presentations of a problem is longer than short-term memory, the learner must construct rather than recall the solution. Jacoby concludes that overt responding is not enough to facilitate learning. Reading the answer immediately prior to the problem reduced performance. He concludes that effort was critical to improving recall in this study. These two results seem incongruous. Apparently something more than effort is necessary for generation to be effective, otherwise overt responding, which is effortful, would be a sufficient explanation.

In five experiments with college students, Graf (1980) compared generating meaningful and anomalous sentences from words given to learners with simply reading the same sentences constructed by the experimenter. Generation of the sentences enhanced word recognition with meaningful and anomalous sentences. Generation enhanced word-pair recognition, a measure of sentence organization, with meaningful sentences but not with anomalous sentences. The results indicated that generation enhances intraword organization with both types of sentences, but enhances integration of sentences only if they are meaningful. He concludes that reading should stimulate bringing words to mind simultaneously and constructing meaningful relations among them.

McFarland, Frey, and Rhodes (1980) compared the effects upon memory of learner-generated words missing in sentences with experimenter-given words in the same sentence. The generation of the missing words by the college undergraduates consistently increased their free recall, even

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across different types of congruity between the word and its context, and different levels of processing, such as a phonemic level or a semantic level.

McFarland et al. conclude that generation is distinct from the phenomena called elaboration and levels of processing, such as phonemically processed and semantically processed words. In their study, phonemically encoded words, as well as semantically encoded words, evidenced a generation effect. For example, learner-generated rhymes (phonemically processed) were remembered better than experimenter-given semantically related words, a result not predicted by levels-of-processing or elaboration theory, which predicts that semantic processing but not phonemic processing enhances long-term memory.

Another interesting finding in the McFarland et al. study was that the usual encoding congruity effect, in which a word must be well integrated with its context, was reversed for the learner-generated words. The generation of semantic incongruities facilitated recall sizably. These authors disagree with Slamecka and Graf (1978), who feel that generation enhances the congruity between a word and its context. McFarland et al. feel that congruity is important for experimenter-given words, but not for learner-generated words. They also feel that Jacoby's (1978) and Slamecka and Graf's (1978) data can be explained by an effort hypothesis, an explanation which is difficult to defend.

In sum, the more impressive interpretations of McFarland et al. are that reading, as different from generation, does not insure a phonemic or semantic analysis of words, nor an integration between words and their context. I would add that reading also does not insure an integration between words and the learner's experience and knowledge.

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McFarland et al. conclude that generation is independent of depth or type of processing. Generation produced a bigger effect than did semantic over phonemic encoding, although the semantic encoding effect did occur with experimenter-given words. They conclude that the actual operations performed on the words, more than their phonemic or semantic characteristics, determines learning from generation. What are these operations? They conjecture (1) personal relevance and (2) effort used in connection with episodic memory. They offer little explanation for the processes involved in generation from semantic memory, as it differs from episodic memory.

In summary, McFarland et al. agree with many earlier studies in the classroom and in the laboratory when they conclude that "an individual's memory will improve dramatically if he provides some of the to-be-remembered information himself" (p. 224).

Stein, Morris, and Bransford (1978) also find that semantic processing of sentences is not always more effective than other types of processing at enhancing comprehension and retention. The enhancement depended upon the relation between the learner's elaboration and the rest of the sentence. When the elaboration made the sentence meaning more precise, comprehension increased. Other types of semantically congruous elaborations debilitated retention. In a related study, Stein and Bransford (1979) compared learner-generated and experimenter-given elaborations. Again, when the elaboration contributed to the development of the tested meaning, or when learners were led to generate relevant questions that lead to precise relations among the parts of the sentence, comprehension increased.

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Dee-Lucas and Divesta (1980) gave college students, or asked them
to generate, headings, related sentences, or topic sentences as they
read a text about minerals. These instructional aids enhanced most
types of learning only when they were generated by the learners.
Generation of topic sentences produced the greatest enhancement of
learning from the text. Giving learners these instructional aids
enhanced learning of subordinate information but not of the structure of
the passage. The learning of structural information was enhanced or
reduced by generation, depending upon the relevance and appropriateness
of the generative activity to the learning measured on the test. Fluent
learners sometimes learned as much from given information as from gene-
rated information. The results depend upon what the learners know and
what they do spontaneously. In this study, generation seems to facilitate
selective attention. Generative activities worked primarily when learners
would not have spontaneously performed them. The learning of material
already salient to the learner did not profit from generative activities
that enhanced selective attention.

Dee-Lucas and DiVesta report important findings about the teaching
of generative activities. By definition any instructional intervention
enhances learning or comprehension only when it induces learners to
perform activities they would not otherwise perform, or not perform as
well. It is not enough then to induce generative processing. In addition
one must enhance the learner's generative processes appropriate for the
situation, in this case to read with comprehension. For further dis-
cussion of these and related studies see the recent volume by Pressley
and Levin (1983b), especially Chapters 2 and 3. For further discussion
of strategies of reading comprehension see the volume by vanDijk and

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Kintsch (1983), and the edited volume by Mandl, Stein, and Trabasso (1984), especially Chapters 8 and 10.

From this review of studies on the generation effect, at least two findings are supported. First, the generation effect is a real one. It is not synonymous with semantic processing or elaboration, although it produces a sizable impact on reading with comprehension and on retention. Second, the nature of the generation effect is only partially understood. It seems to involve a number of cognitive processes, in much the same way that language production, as in speaking or writing, inovlves them. Reading does not always involve these same constructive processes. When we can make reading become more like writing, and engage generative activities, it seems that we can increase reading comprehension.

The Facilitation of Reading Comprehension

From the brief review of related research, there is substantial support for the reality of the generation effect and for its practical utility in improving reading comprehension among school children. There are also good reasons to believe that effective generative activities interact with the developmental level and ability of the learners, the type of reading material, and the teachers and curriculum writers' goals in the design of the instruction. We know, for example, that prior to about age eight, children do not often increase their reading comprehension by generating pictures appropriate for the text. However, we do know that children use pictures and high imagery words quite effectively prior to that age to improve their reading comprehension (Levin, 1981). We also know that when they are asked, children five years and older can construct their own verbal aids--headings, summaries, inferences, and answers to questions--to enhance their reading comprehension. In

addition, we know that children can use these same verbal organizational aids, when they are given to them in a text or by a teacher, to facilitate their reading comprehension.

To facilitate reading comprehension, the model of generative reading implies that we stimulate the learners to construct relations (1) among the parts of the text and, (2) between the text, on the one hand, and the reader's knowledge and experience, on the other hand. To facilitate comprehension these constructed relations should have the following characteristics. First, they must be relations which the reader would not equally well construct without our intervention. Second, the relations must not trivialize comprehension. They must involve more than the learner's short-term memory and more than the surface structure of the text. They should involve the learner's long-term memory of experience, or the learner's knowledge, or both of these. They should involve the text's deep significance in the construction of one or more of its legitimate meanings.

We can stimulate the construction of relations having these two characteristics by designing the reading materials appropriately for the interests and abilities of the learners and by directing them to generate meaning for the text as they read. Whether we should make the relevant relations explicit or ask the learners to construct them is not the central issue. In either case, so long as we do not trivialize learning, the learners can and should be actively engaged in the understanding of the relations and in the text's meaning. When the learners can attend to the task and can construct the text's meaning or meanings, then they should be given the instructions and the direction appropriate for their developmental level, knowledge, and background. When the learners

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cannot adequately attend to the task or cannot construct important meanings from it, then they should be helped to attend to the meaning of the text, and they should be given the relations to be learned, which they can elaborate upon in an attempt to understand and to remember them.

More precisely, the model implies that when the readers cannot attend to the text, then training in self-management techniques, in cognitive strategies of focusing attention, and in rehearsal techniques are appropriate ways to improve the learners' attention, as are appropriate goals and objectives. The model also implies that the text can be changed to provide more interesting or more appropriate reading materials for the learners' objectives.

When the readers attend to the text, have the appropriate focus and knowledge, decoding skills and vocabulary, but cannot generate the significant relations discussed in the previous section of this paper, then the relations should be given to the learners in verbal statements or in pictures, diagrams, graphs, and the like. To avoid trivializing learning, the readers should not be asked to memorize these verbal statements nor to copy these spatial representations. The readers should be actively engaged in testing these relations against the parts of the text or against their knowlege and experience.

When the readers attend to the text, have the appropriate background and knowledge, decoding skills and vocabulary, and can but do not generate legitimate meaning for it, then teachers can question them about its meaning; give them objectives to attain; ask them to draw pictures; make predictions; look for main ideas, sequences, cause and effect relations; draw inferences; infer conclusions; construct summaries; make comparisons;

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and evaluate the significance of the text. In addition, the text can include metaphors, similies, analogies, pictures, questions, objectives, inferences, comments, and comparisons that do not state the relations to be learned but that do lead to their construction by the learners.

Last of all, when the readers attend to the text, have the appropriate background knowledge, decoding skills, and vocabulary, and do generate legitimate meaning for it, then the teacher, or the directions in the text, can subtly suggest alternative, deep meanings that might otherwise be omitted.

The abilities and background knowledge of the readers influence the choice of generative activities, as this progression of teaching methods clearly indicates. Other considerations also influence the choice and use of generative reading tasks. First of all, the type of text or discourse will influence the choice of generative activities. For a technical manual, the generative activities will sometimes be different from those chosen for an expository text. The type of comprehension of the skills of comprehension emphasized in a given problem will also influence the choice of generative activities.

Even more important than the choice of a generative task is the understanding of the nature of a generative task. Almost any of the above tasks or activities can be trivialized. Take metaphor for example. In a well written chapter on generative metaphor, Donald Schon (1980) shows the significance for social policy of metaphors which lead to a new understanding of old social problems. An urban area often described as a slum receives quite different treatment from a city government that has learned through generative metaphor to view it as home to people whose dislocation because of urban renewal would destroy stable social relations and disrupt individuals' lives.

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Not all constructions are generative for every reader. A generative activity must lead to a new or better understood relation. When we discuss reading comprehension, in a non-trivial sense a generative task must also lead to the construction of a relation among the parts of the text or between the learner's knowledge and the text.

Generative Instructional Activities

We selected several activities to teach learners, to generate relations (1) among the parts of the text, or (2) between the text and their knowledge. For example, headings, summaries, and objectives are useful for teaching relations among parts of the text. But examples, paraphrases, applications, and metaphors are useful for teaching relations between the text and the learner's knowledge.

At a deeper level, the design of the instruction involves organizing sequences of activities that in combination will attain the types of comprehension and the level of retention necessary for understanding the particular text we ask the students to read. We combined instruction in relating the parts of the text to one another with instruction in relating the text to practical problems that occur in their experience.

The Purpose of the Studies

In sum, the major objective of the series of three studies is to develop, try out, compare, and evaluate different generative instructional methods and curricula for teaching reading comprehension to marginally literate Army enlisted personnel. Each nine hour instructional treatment employed a verbal or imagery generative teaching procedure. Some generative treatments also taught metacognitive strategies to the students. A control group was included in the first two studies to compare the generative treatments to instruction provided in the regular Army classes in basic skills.

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Another objective of the series of three studies was to test the hypothesis that the generative treatments increase reading comprehension *under* realistic teaching conditions in basic skills classes taught on Army Bases. The hypothesis was tested at several Army Bases in California and at one base in Hawaii, using intact basic skills classes. In studies one and three Army employed BSEP (Basic Skills Education Program) teachers provided all of the instruction in the experimental and control groups. In study two, the instruction was presented by UCLA employees, who were experienced reading teachers enrolled in doctoral programs in the Graduate School of Education.

However, the central objective of the studies was not to test hypotheses about generative teaching. It was to develop, try-out, and evaluate, under realistic conditions, curricula and instructional pro- cedures that teachers in military basic skills classes could use to teach reading comprehension. The purpose of both objectives is to improve the teaching of reading comprehension.

The three studies were preceded by a pilot study in which three sets of curriculum materials, each providing nine hours of classroom instruction, and one to two hours of testing, were written and used to teach three different strategies of reading comprehension. The series continued with the first major study, in which two more sets of nine-hour long curriculum materials were written. They were designed to teach verbal or imagery generative reading comprehension strategies.

In the second study of the series, three more sets of nine-hour long curriculum materials were written. They compared a verbal generative strategy, a metacognitive verbal strategy, and a meta- cognitive verbal strategy with examples.

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A control group of directly comparable learners was used in the pilot study, the first study, and the second study. In the first and second studies, the control group received the regular reading instruction taught in the Army basic skills classes. Time to learn was held constant across all experimental and control groups in the Pilot Study, Study One, and Study Two.

The third and final study of the series centered on the writing, tryout, and evaluation of a nine-hour long curriculum on reading comprehension prepared for use, and presented to the learners, in Apple II microcomputers.

Pilot Study

Design. The participants were assigned individually at random to three reading comprehension self-instructional treatments. The dependent measure was a reading comprehension posttest prepared for this series of studies. See the Appendices for a copy of the test.

Subjects. The participants were 25 Army enlisted personnel enrolled in two BSEP classes taught at an Army Base in California.

Treatments and materials. There were three self-instructional treatments: verbal, metacognitive, and control.

The first treatment instructed learners in the use of generative verbal comprehensive strategies. The second treatment instructed learners in the use of generative verbal comprehension strategies and metacognitive monitoring strategies. The third treatment provided learners only with the practice readings used in the first and second treatments. The practice readings included technical military material from Army manuals and excerpts from newspapers magazines, and short stories. The practice

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readings were held constant across all three treatments, as was the amount of time given to learn.

The Generative Verbal Strategies treatment concentrated on instructing learners to find the main ideas and topic sentence and to construct metaphors and analogies, sequences, hierarchy diagrams, and summaries. The first part of the 98-page booklet included 48 pages of instruction in the various skills. Each of the skills was taught in a discrete unit with accompanying examples of skill application followed by practice readings and exercises. The second part of the booklet was composed of 50 pages of practice readings and exercises designed to demonstrate how certain skills could be used in conjuction with others. Instruction and practice were self-paced.

The second treatment, the Metacognitive and Generative Verbal Strategies, involved the same instruction in skills acquisition and utilization as the Generative Verbal Strategies treatment, but also included training in metacognitive skills for self-monitoring procedures. All practice readings and exercises were identical to the first treatment, with the exception that all practice exercises also included a series of "reading manager" questions. Because of the addition of the metacognitive skills instructional unit and the expanded response categories in the practice section, the booklet for the second treatment was 125 pages in length.

The third treatment, the Control Treatment, which was presented in a booklet 48-pages in length, consisted of only the readings used in the first and second treatments. The only instructions in the booklet asked students to read the passages.

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Procedures. Prior to individual random assignment of learners to treatments, the students were given a 45-minute reading comprehension test developed in this experiment. Questions in this test were typical of most standardized tests of reading comprehension, involving both literal and inferential reading comprehension multiple-choice items based on one or two paragraph readings. A total of 36 items was used in the test, a copy of which is in the Appendices to this report.

Immediately after the pretests, and for the eight class days following it, students were given approximately 45 minutes per day to work on the treatment booklet they had been assigned. Instruction by the basic skills teachers was limited to answering questions about procedures. Teachers were instructed not to provide instruction beyond what was included in the booklets.

On the 10th class day, students were given a posttest, an identical copy of the pretest, except for the addition of questions following each reading that asked participants to record what skill(s) they used in answering the questions. Following the adminstration of the posttest, participants were asked to fill out a two-page questionnaire which included questions on the difficulty level of the instruction and the readings. The questionnaire also asked participants to evaluate their performance and understanding of the materials. Lastly, the question-naire asked participants to evaluate how well, or poorly, they had learned each of the skills.

Results. The pilot study provided significant information for the extensive revisions implemented for the first study. It was clear through both personal interviews and the qualitative data generated in the questionnaire that the written self-instructional format of the

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booklets would not best serve the needs of the soldiers in the basic skills program. Much-needed classroom interaction among learners and between the teacher and the students was hindered by this approach. The soldiers generally felt ineffective in their learning efforts because of the self-instructional technique. Teachers also felt encumbered by this change in classroom format.

Some of the soldiers found the booklets overwhelming in length, which created initial negative feelings toward the materials. Few participants were able to complete their treatments in the allotted time. In addition, the reading and vocabulary levels of the treatements were too difficult for a number of the participants.

There were mixed reactions about the relative usefulness of the comprehension strategies. Most positive responses favored the "Topic Sentences," "Summaries," and "Getting the Main Idea" sections, although several soldiers commented favorably about the "Analogy and Metaphor" strategies. Many soldiers perceived the learning of particular strategies as informative and beneficial to their reading proficiency.

Though this small sample size did not permit the effective use of statistical analyses, gain in comprehension occurred in some treatments. One basic skills class showed sizable gains in both the Generative Verbal Strategies and in the Metacognitive and Generative Verbal Strategies treatments, while the other BSEP class showed no consistent pattern of changes across the three treatments. The control group showed no gain in comprehension.

Study One

From the findings of the pilot study we made several decisons about the design, materials, and procedures to be used in the first of three studies on the teaching of generative reading comprehension techniques to young adults in basic skills courses. First, we decided to retain group instruction, with experienced and supportive basic skills teachers instructing intact classes of learners with comparable reading abilities. Intact groups and reading teachers provide a familiar and relatively secure environment that enhances motivation and minimizes anxiety and fear of failure. Intact groups and reading teachers introduce variance across treatments that complicates data analysis. However, intact groups and live reading teachers also add the important elements of practical and representative actual teaching and learning environments that exist in basic skills classes. As a result, our results gain some utility and meaning from the natural and realistic environments used in the study.

Second, reading materials were selected because of their utility to the Army, interest to the participants, and because of their appropriate reading level. Because the participants in Study One, unlike the participants in the Pilot Study, were either largely new recruits or were people wishing to reenlist in the Army, a majority of the reading selections were taken from the recently revised Army Manual of Common Tasks. To add variety and generality to the reading passages, the remaining selections were taken from general references other than Army materials.

Third, the instructional materials were completely rewritten, greatly shortened from their 98-125 page lengths, and centrally focused upon the generative reading comprehension skills that the research

literature and the pilot study indicated held the greatest promise of success--summaries, inferences, main ideas, and examples. The written instructional materials were given one lesson at a time to the participants. These brief lessons of 5-10 pages each seemed more manageable to the soldiers than the entire 100-page books given to the learners in the pilot study.

Design. Within the constraints of time and the number of classes available at any one time, intact classes were assigned, at random, to three treatments, two experimental and one control condition.

Participants. A total of 101 participants in basic skills classes on three Army Bases in California were included in the study. In addtion, several participants were dropped from the data analyses because they failed to complete the instruction, often because they were reassigned by their commanding officers to other duty.

Treatments and materials. The instruction in all three treatments lasted for a total of nine 45-minute class sessions. A Generative Verbal Strategy treatment, a Generative Imagery Stratey, and a Control condition were the three treatments used in the first study. The Generative Verbal Strategy treatment consisted of three main sections which taught, respectively, how to compose (1) headings and subheadings, (2) inferences, and (3) summaries. Throughout each of the nine lessons, the learners were required to generate these three types of verbal elaborations for each reading passage they encountered. Group work was included in each lesson. The basic skills teachers were free to work with any and all students throughout each class session.

The Generative Imagery treatment consisted of the same basic set of materials and the same general procdure. However, instead of constructing

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the three types of verbal elaborations mentioned in the discussion of the Generative Verbal treatment, the learners were asked quickly to construct interactive "stick figures," simple diagrams, or pictures to summarize relations across sentences and paragraphs in the text.

The Control treatment was given the same amount of time as was given to each of the two experimental treatments. However, the BSEP teacher of each intact Control treatment class provided her customary BSEP reading instruction in class, without the use of any experimental treatments or reading materials.

Procedure. Where it was possible, the experimental treatments were assigned randomly to BSEP classes. Often it was not possible to make random assignment of classes to treatments. The BSEP classes were each taught by experienced Army-employed BSEP instructors. The BSEP teachers followed the standard Army reading curriculum for the control groups. All instruction in experimental and control groups lasted nine classroom hours (45 minutes per hour). The high rate of military personnel mobilization often made it necessary to teach small groups, sometimes of 5 or 6 participants, in Army classes scheduled according to the needs of the Army over an 18 month period.

For each participant, the study lasted 11 hours class consisting of a pretest (45 minutes), instruction for nine 45 minute classroom hours, a posttest (45 minutes), and a questionnaire (5 minutes). The pretest consisting of 36 literal and inferential reading comprehension multiple-choice items, was adminstered by the regular basic skills instructors before the instruction began. (See the Appendices for a copy of the pretest.) The tests and lessons used in the study were designed to fit into the students' normal class period. Participants were allowed 45 minutes to complete the pretest.

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For nine consecutive class days, participants in the experimental groups received one unit or lesson per class period. Each lesson was taught in a 45-minute class. Each lesson consisted of a 5-10 page booklet, teacher's comments, and brief class discussions. Based upon preliminary findings in the pilot study that the BSEP students preferred group to individual instruction, the BSEP teachers provided daily group instruction and individual and group guidance as they proceeded through each lesson. The group work was designed to increase student motivation and assure completion of the assignments.

The posttest was administered during the last hour of the class. The posttest was a repeat measure of the pretest. Participants had 45 minutes to complete the posttest. After the posttest, the partici-pants were asked to fill out a questionnaire evaluating their own performance, and also evaluating the materials.

Results and discussion. Data were collected from a total of 101 participants, including posttest data only on 38 participants from the Verbal Strategies and Control Groups. The posttest data from these 38 participants were not included in subsequent statistical analyses. Data from the remaining 63 individuals were used in all statistical analyses.

As shown in Table 1, highly statistically significant gains in reading comprehension were found within each experimental group. Test scores for the Imagery Strategy Group improved 20.3 percent ($p < .001$) from a pretest mean of 22.2 to posttest mean of 26.7). Test scores for the Verbal Strategy group improved by 15.6 percent ($p < .01$) from a pretest mean of 20.6 to a posttest mean of 23.8. The Control Group showed no gain from pretest to posttest.

Table 1

Means, Standard Deviations, and Gain Scores of the Experimental and Control Groups

Treatment	Pretest	Posttest	Gain	t	Level of significance	% of gain over pretest
Imagery	22.2	26.7	+4.5	5.8	$p < .001$	20.3%
Strategy	(4.6)	(2.7)				
(N=23)						
Verbal	20.6	23.8	+3.2	3.7	$p < .01$	15.5%
Strategy	(5.6)	(4.5)				
(N=24)						
Verbal		24.2				
Strategy		(4.1)				
Posttest Only						
(N=19)						
Control Groups						
Control	21.1	20.8	-.3	-.4	n.s.	--
(N=16)	(5.4)	(5.4)				
Control:		18.2				
Posttest Only		(7.4)				
(N=19)						

These differences in gain scores between the control group, which showed no gain, and the two experimental groups, which showed 16%-20% of gain, indicate that the generative treatments facilitated reading comprehension as a result of the nine class hours of classroom instruction. The gain, approximately equal to one standard deviation, is sizable, considering the brief instructional time of nine hours, and appears to have practical as well as statistical significance.

The instruction was provided in standard basic skills classrooms on Army Bases. All classes were taught by basic skills reading teachers regularly employed by the Army on these bases to teach BSEP classes, including reading instruction. One implication of these findings is that the generative reading comprehension instruction provided in the two experimental treatments improves reading comprehension when used under the actual teaching conditions found on these two Army Bases.

The data of Study One were also analyzed by two other statistical methods. Planned comparisons tests, contrasting each of the two experimental groups with the control group, and contrasting pretest and posttest scores within groups, provide a useful way to examine the predictions of the generative model. The model predicts, as discussed in the introductory section of the paper, that each generative treatment should have a mean higher than the control group mean. Analyses of covariance of the posttest scores of the three treatments, with the pretest score as a covariable, provide another useful way to examine the effects of the treatments, using gain scores.

Because several intact classes of students were involved in the study, as an added precaution before using planned comparisons to test mean differences in posttest scores across experimental and control

groups, we examined the participants' initial levels of reading ability. Table 2 presents the Test of Adult Basic Education (TABE) vocabulary, comprehension, and total score means of the participants in the experimental and control groups. From these data it is clear that prior to the beginning of the study, the soldiers in the three treatment groups exhibited similar reading ability scores. Across the treatments, the students varied less than one grade level, on the average.

The prestest scores also show that the participants in the treatments averaged approximately the same initial level of reading comprehension ability. An analysis of variance of the treatments' pretest scores revealed no statistically significant differences among the three means $(F_{2,60} = .5, n.s.)$.

As we stated earlier, the hypothesis of the study was that each experimental treatment would produce a higher mean posttest reading comprehension score than would the control group. Planned comparisons were performed to test this hypothesis, using gain scores (Table 3) and using posttest scores (Table 4). The gain scores revealed highly statistically significant differences between each experimental group and the control group ($p < .002$ for the imagery group and $p < .006$ for the verbal group).

When posttest scores across groups are used, the difference in the means of the Imagery group versus the Control group ($p < .001$) and the Verbal group versus the Control group ($p < .002$) are again statistically significant at high levels.

These planned comparisons, coupled with the analysis that indicated the initial reading ability was not different across the treatment groups, indicate again that the generative imagery and verbal treatments each facilitated reading comprehension in this study.

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Table 2

TABE Score Means and Standard Deviations of the Experimental

and Control Groups Prior to Treatment

	TABE SCORES		
Treatments	Vocabulary	Comprehension	Total
Imagery	8.14	9.04	8.53
Strategy	(1.38)	(1.23)	(1.24)
(N=23)			
Verbal	8.60	8.27	8.30
Strategy	(2.31)	(1.75)	(1.73)
(N=24)			
Control	7.76	8.31	7.99
(N=16)	(1.79)	(2.18)	(1.90)

Table 3

Planned Comparisons of Treatment Groups' Gain Scores

Treatment comparison	F Value	df	Level of significance
Imagery vs Control	15.68	1,60	$p < .0002$
Verbal vs Control	8.07	1,60	$p < .006$

Error Mean Square = 14.06

Table 4

Planned Comparisons of Treatment Groups' Posttest Scores

Treatment	ss	df	F value	Level of significance
Imagery vs. Control	261.41	1	27.99	$p < .0001$
Verbal vs. Control	99.69	1	10.67	$p < .0018$

Error mean square = 9.46

Analyses of covariance were also completed to test the statistical significance of the differences on the posttest across the treatments. The pretest and TABE scores were examined as covariates that may have affected the interpretation of the posttest data (Table 5). TABE scores were found to have no effect on the posttest scores, while pretest scores were found significantly to affect posttest scores.

Therefore, an analyis of covariance using the pretest as a covariate was conducted. Homogeneity of the covariate regression slopes across the three treatment groups was tested to determine if the ANCOVA was justified. The interaction between the pretest and the treatment was not significant ($F_{2,57}$ = 2.97; n.s.). Hence, the slopes of the pretest covariate are parallel in all three groups and the use of the ANCOVA is justified.

Table 6 presents the results of the ANCOVA. Even with the effect of the pretest parceled out of the analysis, the treatment is still highly statistically significant ($F_{2,59}$ = 14.01; $p < .0001$).

Posttest means are shown after they have been adjusted for the covariate (Table 7). Posttest scores of participants in the Imagery Strategies group are the highest followed by the Verbal Strategies group and, lastly, the Control group.

By all measures, gain scores, planned comparisons of treatments posttest scores, and analyses of covariance, the hypothesis of the study was supported. The experimental treatments produced a statistically significant, and a practical, increase in reading comprehension in nine hours of group, classroom instruction taught by Army BSEP teachers working under realistic instructional conditions representative of basic skills classes on Army Bases.

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Table 5

Effects of Covariates on Posttest Scores

Source	ss	df	ms	F value	Level of significance
Treatment groups	330.80	2	165.40	17.59	$p < .0001$
Posttest scores	534.72	1	534.72	56.85	$p < .0001$
Vocabulary	.02	1	.02	-----	$p < .966$
Comprehension	14.63	1	14.63	1.56	$p < .218$
TABE Total	9.74	1	9.74	1.04	$p < .313$
Error	526.70	56	9.4		
Corrected total	141.60	62			

Table 6

Analysis of Covariance of Posttest Scores

with Pretest Scores as the Covariate

Source	ss	df	ms	F value	Level of significance
Treatment groups (adj)	261.73	2	130.87	14.01	$p < .0001$
Pretest (adj)	534.72	1	534.72	57.25	$p < .0001$
Error (adj)	551109	59	9.34		
Adjusted Total	347.54	62	21.73		

Table 7

Adjusted Means and Standard Errors of Posttest
Scores with Pretest Scores as the Covariate

Treatment	Adjusted		Unadjusted	
	Posttest Mean	Posttest Standard Error	Posttest Mean	Posttest Standard Error
Imagery	26.20	.64	26.7	.56
Verbal	24.15	.63	23.8	.84
Control	20.92	.76	20.8	1.35

Before discussing these findings further, several correlations between tests used in this study should be mentioned. Pretest and posttest scores were correlated across treatments with the TABE vocabulary and comprehension scores of the participants (Table 8). Participants scores on the comprehension measure used in Study One correlated more highly with scores from the comprehension portion of the TABE test ($r_{pretest} = .641$; $r_{posttest} = .533$) than with the vocabulary portion of the test ($r_{pretest} = .537$; $r_{posttest} = .366$). Correlations were also computed between the pretest or the posttest and the workbook scores, which measured the number of generations constructed by the learners during the instruction. In the Imagery Group, these correlations were .45 and .26 between the workbook scores and the pretest and the posttest, respectively. For the Verbal Strategies Group the comparable correlations were .42 and .43, respectively, both statistically significant ($p < .05$).

Pretest and posttest scores were correlated within each treatment group. Within the three treatment groups, posttest scores correlated highest with pretest scores in the Control Group and lowest with pretest scores in the Imagery Group ($r_{control} = .834$; $r_{verbal} = .687$; $r_{imagery} = .578$).

We also computed a path analysis to determine if the number of written or imagery responses constructed during the instruction related to the posttest score. Although a large sample would have given a better test of the effect on comprehension of writing responses during instruction, the path analysis showed no statistically significant effect.

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Table 8

Correlations Among Measures of Reading Ability,

Pretest, and Posttest Scores; All Treatments Combined

| | TABE | | | | |
	Vocabulary	Comprehension	Total	Pretest	Posttest
Vocabulary	1.0	--	---	---	---
Comprehension	.637	1.00	---	---	---
TABE Total	.903	.894	1.00	---	---
Pretest	.537	.641	.636	1.00	
Posttest	.366	.533	.475	.653	1.00
N=63					

In our interviews of students and teachers, we found a sentiment against constructing pictures or images during instruction. The soldiers viewed the construction of images, or drawings, as something children would be asked to do in reading classes. In addition, we have no way of knowing how many summaries and other relations across sentences were generated but not written. Many of the students in these classes in this study had great difficulty writing their ideas. Writing was more than time consuming. It was a chore.

The effective part of the instruction may be due to the construction of relations between text and knowledge, and among different parts of the text. However, asking marginally literate readers to write these relations does not seem to be the best way to get them constructed. Drawing diagrams or pictures might be a better procedure, provided the activity can be presented as one which is appropriate for adults, and not like that of children in reading classes. It is clear that the participants do not regularly generate relations between text and background knowledge as they read. That activity is not part of their model of reading comprehension.

In summary, the statistical analyses of the data clearly support the effectiveness of the treatments. Ironically, the imagery treatment, which produced the larger mean gain of the two treatments was not as well liked by the soldiers as was the more conventional, in appearance at least, verbal strategy treatment. The latter treatment was well received by nearly all of the participants.

In either case, the treatments emphasized the generation of relations across sentences in the text, and between the text and the reader's knowledge and experience. Both of these activities are somewhat uncommon

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and unexpected. Many of the students did not think of these activities as ways to enhance reading comprehension. These relation-building skills can be performed or quickly learned. But they are not initially perceived as relevant to reading comprehension.

The statistical analyses support the hypothesis of the study. However, support for the hypothesis of the study was a secondary goal of the project. The primary goal of the study was to prepare, test, and evaluate a curriculum that would, in realistic learning environments, enhance reading comprehension in nine hours. The study succeeded in accomplishing its primary objective.

These reading comprehension materials contain elements that we have learned are important in teaching reading comprehension in Army basic skills classes. First, the subject matter of the reading materials is critical. The soldiers in this study were quick to show interest in a few subjects, and quick to show a lack of interest in many other subjects. We found that they preferred to read passages taken from Army manuals, provided the soldiers were trying to remain in the Army. They also liked to read about currently popular people in sports and in other entertainment fields. There was a very narrow window of interest that we learned to accommodate in our selection of reading passages.

Second, we learned in the pilot study and in the first study that the way the passages are written and bound is critical in gaining and holding attention. The packaging of materials in brief, daily lessons of a few pages, rather than in one book of 50-100 pages to be used over 10 days, was a critical factor. The size or bulk of the larger package discouraged many of the students.

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Third, the difficulty of the text was another important factor that we think has been misunderstood in some earlier work with marginally literate students. In our sets of materials we computed readability using a standard formula. The formula was useful, but only partially so. The qualities that made a text interesting and understandable extended well beyond in sentence length and average number of syllables per word. These addtional qualities included the learner's familarity with the passages and the topics and their relevance to the soldier's purposes in learning to read. Passages of relatively complex structure and length can be interesting and understandable if they relate to the learner's interest and background knowledge. Readability formulas omit these important cognitive and affective characteristics of the relation between readers and text.

Fourth, the self-concept of the learner is an important psychological element in learning to read with comprehension. The reading materials and the method of instruction should be designed to be appropriate for young adults, their interests, and their need to retain dignity in a situation that many easily find embarrassing. The reading materials should deal with mature themes and topics, not simple, child-like stories chosen to satisfy readability formulas. It is difficult, but not impossible, to find stories and expository text that meet these constraints, that are both interesting to young adults and written in straightforward, familiar language they can understand.

Group instruction also contributed an important element to the teaching. The soliders wanted to work in groups and to learn from speaking with each other and with a teacher. In retrospect this feeling is quite understandable. A main reason they are in the BSEP class is

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that they have difficulty reading. They are better at learning from

conversation and from spoken language. The teacher and the class provide

these familiar and more effective means of learning. There is also a

feeling of belonging and support that comes from being one of a group of

people who face the same problem. The group interaction seemed important

in their classroom learning.

A talented and supportive teacher who understands reading compre-

hension, knows the soldiers' interests and self-concepts, and expresses

complicated ideas in straightforward, elegant language contributes

significantly to the learning. The students do not know or believe that

they can learn to read by reading about reading. They feel more confident

learning by listening to others. Computer-assisted instruction in

reading comprehension might also be designed with this point in mind,

using an audio component to explain some of the text, and a teacher to

provide some encouragement and discussion.

Last of all, the model of reading comprehension possessed by the

students influences their learning to read with comprehension. Compre-

hension involves learning strategies and generative processes that need

to be taught and learned. Reading comprehension is an active, thoughtful

process involving the generation of relations among the parts of the

text and between the text and knowledge. Many of the students we studied

viewed reading comprehension as the learning of new vocabulary words.

The teaching of reading comprehension to these students starts with

their model, which is useful as far as it goes, then leads them to

understand the critical parts of a more sophisticated and more effective

model of reading comprehension.

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Design. Within reading difficulty levels, classes were assigned at
random to the four treatments. The dependent measure was a reading
comprehension posttest. The four treatments were (1) Summaries, Headings,
and Inferences, (2) Metacognitive, (3) Metcognitive + Examples, and
(4) Control. These treatments are described in the following section on
Treatments and Materials.

No Imagery treatment was included in Study Two, even though the
Imagery treatment was at least as effective as the Verbal Strategies
treatment studied in Experiment I. We deleted the Imagery treatment
because most of the soldiers in it thought that drawing simple pictures
or diagrams as they read was embarrassing and childlike, a task more
appropriate for elementary school children than for adults.

Participants. Twelve reading classes in the BSEP program at Schofield Barracks, Hawaii participated in the study. A total of 149 enlisted personnel were included in the pretest and initial instruction. A total of 115 participants completed the instruction and posttest. Due to Army requirements, a number of participants were ordered to other duties and were absent for a large part of the study (two days or more). They were deleted from the study. In addition, the Control Group was dropped from the study because its members were Non-Commissioned Officers. None of the experimental groups' participants were Non-Commissioned Officers. In its place, the Control group of the first study was substituted. The final number of participants in Study Two was 100.

Treatments and materials. Three experimental reading comprehension strategy training treatments were used in this study, in addition to the Control treatment. The first of the treatments, the Summaries, Headings, and Inferences Treatment, attempted to teach three specific generative verbal strategies—headings and subheadings (including topic sentences), inferences, and summaries. This treatment was a revision of the Verbal Strategies Treatment used in the first study of this series. The two curricula are essentially identical. The second treatment, the Meta-cognitive Treatment, taught one unified strategy for constructing a summary. The third treatment, the Metacognitive + Examples Treatment, attempted to teach the same unified summary construction strategy as the Metacognitive Treatment, but, in addition, also taught participants to relate reading content to their past experience and their knowledge.

Procedure. The Summaries, Headings, and Inferences Treatment was presented to participants as nine discrete lessons, averaging four pages each in length. Learners were instructed in understanding reading as a

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building or generative process (1 lesson), generating headings and sub-headings (2 lessons), creating summaries using headings, sub-headings, topic sentences, and main idea skills (2 lessons), generating inferences (1 lesson), synthesizing all of the strategies in summary building (1 lesson), and review and practical application of the skills (2 lessons).

The Metacognitive Treatment was also presented to participants in nine discrete lessons, averaging four pages each in length. In both the Metacognitive and the Metacognitive + Example treatments, the major teaching emphasis was on the sequential presentation of three basic elements in formulating a summary.

The introduction to each of the three treatments concentrated on teaching the learner that reading is a process of building meaning by relating sentences to one another. Unique to the Metacognitive + Examples Treatment was the inclusion of training in the use of the learner's past experience to facilitate reading comprehension, which was introduced in the initial lesson and presented throughout the rest of the booklet in all practice exercises.

The strategy training in the Metacognitive and the Metacognitive + Examples treatments was identical. Rather than training comprehension skills discretely and then instructing learners in how they could be used in conjunction with one another, as was done in Summaries, Headings, and Inferences Treatment, the two Metacognitive treatments followed a sequential process of teaching learners summary building through a three-question process. The second and third lessons instructed learners in establishing "Who" or "What" a reading was about. Within the context of these lessons, participants were taught how to identify and use a topic sentence to answer these two questions. Lessons four and five

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taught participants to answer the second of three questions in summary building--"What Happened" in the reading. In conjunction with this ability, learners were taught to identify the important parts of a technical military reading and how to use order and sequence to build meaning. Lesson six instructed the learners in the use of the last of the three questions--"Why" did the events in the reading transpire and "Why" did the author write what he did. Within this lesson the use of inference was explained and the learners were asked to apply this skill to answering the "Why" question. Lesson seven reviewed all of the material that learners had been taught previously and demonstrated the use of the three-quarters summary building technique. Lessons eight and nine were used for practice in which learners applied the unified summary building strategy to more difficult practice readings. Deliberate emphasis was placed on technical military readings throughout instructional and practice lessons.

The Control Treatment subjects participated in their normal reading classes in the BSEP program and used only the materials that are currently in general use in that program. None of the experimental materials or procedures were used in the Control Treatment.

Assignment to three levels of reading classes in the BSEP program at Schofield Barracks is customarily done according to the individual's reading level, as it is assessed through the TABE (Test of Adult Basic Education) test. Level I classes include those participants assessed at grade levels 5 and 6. Level II classes include participants assessed at grade levels 7 and 8. Those learners assessed at grade level 9, or above, are assigned to Level III classes. Because of this assignment procedure, an unequal number of classes at each level is not uncommon.

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At the time of this study, nearly all students were in Level II classes or in Level III classes. Within the constraints of the teachers' schedules, the three experimental treatments were assigned randomly to classes within these reading levels.

Three UCLA graduate students, all experienced reading teachers, participated in the project as the teachers of the nine experimental treatment classes. Reading classes in the BSEP program at Schofield Barracks met for one hour and 30 minutes on Monday, Wednesday, and Friday, and one hour and 45 minutes on Tuesday and Thursday. Because of economic and schedule constraints, it was decided that the entire period would be used for five class days with two lessons being taught each of the days.

The pretest consisted of 36 literal and inferential reading comprehension multiple-choice items. The pretest was administered by the regular BSEP instructors the day before the instruction began. Participants were allowed 45 minutes to complete the instrument.

During the first four class days, the participants in the experimental groups received two lessons per class period. Each lesson was taught in approximately 50 minutes. Participants were given a small break between lessons. On the fifth class day, the ninth lesson was taught during the first half of the class and the posttest was administered during the second half of the class period. The posttest was a repeat measure of the pretest. Participants had 45 minutes to complete the instrument. Following the posttest the participants were asked to fill out a questionnaire evaluating their performance and the materials.

Results and discussion. The data were analyzed by the same statistical methods used in Study One. That is, experimental and control

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groups' posttest scores were compared by analyses of covariance and by planned comparisons tests. In addition, gain scores, from pretest to posttest, were analyzed. Means and standard deviations of the variables, as well as correlations among the major variables, were also computed.

For two reasons, participants with high TABE scores (10.0 or above) or high pretest scores (27 or above, i.e., 75% of the possible score) were not analyzed. The first reason is to make the data more directly comparable to the data of the first study. The second, closely related reason was that the participants at Schofield Barracks fell largely into the third or highest reading ability level. Because we want to develop materials that are effective with lower and middle ability levels, our tests were written accordingly. Participants who score 75% or better on the pretest are not highly appropriate for our materials and our purposes, and do not give them an adequate test.

Statistically significant gains in reading comprehension from pretest to posttest were found for each one of the three experimental treatments (see Table 1). Posttest scores improved by 19.6% for the Summaries, Headings, and Inferences Strategy Group (p < .0001), 12.7% for the Metacognitive Group (p < .001), and 22.9% for the Metacognitive + Examples Group (p < .0001). The Control Group showed no gain.

Table 2 presents the Test of Adult Basic Education (TABE) score means and standard deviations for each treatment group. These data show that, prior to the onset of the study, individuals in the experimental and control groups all scored near the 8th grade level in reading ability. An analysis of variance also revealed no statistically significant differences among participants of different treatment groups based upon their pretest scores (F = 2.27, n.s.). This finding implies that the

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Table 9

Means, Standard Deviations, and Gain Scores

of the Experimental and Control Groups

Treatment	Pretest	Posttest	Gain	t	Level of significance	% of gain over pretest
Summaries, Headings, and Inferences Strategy (N=29)	18.9 (4.1)	22.6 (3.9)	+3.7	5.9	$p < .0001$	19.6%
Metacognitive Strategy (N=26)	20.5 (3.6)	23.1 (4.2)	+2.6	4.2	$p < .001$	12.7%
Metacognitive + Examples Strategy (N=29)	17.9 (5.7)	22.1 (4.6)	+4.1	6.7	$p < .0001$	22.9%
Control Group (N=16)	21.1 (5.4)	20.8 (5.4)	- .3	.4	n.s.	--

Table 10

TABE Score Means and Standard Deviations of the Experimental

and Control Groups Prior to Treatment

	TABE SCORES		
Treatment	Vocabulary	Comprehension	Total
Summaries, Headings, and Inferences Strategy (N=29)	7.86 (1.82)	8.20 (1.53)	7.99 (1.50)
Metacognitive Strategy (N=26)	7.86 (1.19)	8.03 (1.33)	7.93 (0.96)
Metacognitive + Examples Strategy (N=29)	7.87 (1.81)	7.54 (1.69)	7.63 (1.56)
Control Group (N=16)	7.76 (1.79)	8.31 (2.18)	7.99 (1.90)

groups were comparable to one another in reading comprehension ability when the study began.

Planned comparisons among treatment groups were conducted using gain scores (Table 3) and also with posttest scores (Table 4). Both sets of statistical comparisons indicated that each experimental treatment group statistically significantly outperformed the control group. In the gain score analysis, Table 3, the Summaries, Headings, and Inferences, Metacognitive, and Metacognitive + Examples groups each produced a mean higher than the mean of the Control Group ($p < .0001$, $p \leq .006$, and $p < .0001$, respectively).

In the posttest scores analysis, the means of the Summaries, Headings, and Inferences, Metacognitive, and Metacognitive + Examples groups were each statistically significantly greater than the mean of the Control Group ($p < .0002$, $p < .003$, and $p < .0001$, respectively).

Analyses of covariance were used to compare posttest score differences across the experimental and control groups. The pretest and TABE scores were used as covariates to determine if differences among them across treatments may have had some effect on the posttest scores. As Table 5 indicates, only the vocabulary portion of the TABE test and the pretest score significantly affected the posttest scores ($p < .05$ and $p < .0001$, respectively). Therefore, an analysis of covariance using the pretest and vocabulary scores as covariates was conducted.

Homogeneity of the slopes for both covariates across the three treatment groups was tested to determine if the ANCOVA was justified. The interaction between the pretest and the treatment was not significant ($F_{3,88} = .60$, n.s.). Similarly, the interaction between the vocabulary scores and the treatment was not significant ($F_{3,88} = .37$, n.s.).

Table 11

Planned Comparisons of Treatment Groups' Gain Scores

Treatment comparison	F Value	df	Level of significance
Summaries, Headings, and Inferences vs Control	15.74	1,96	$p < .0001$
Metacognitive vs Control	7.88	1,96	$p < .006$
Metacognitive + Example vs Control	19.46	1,96	$p < .0001$
Summaries, Headings, and Inferences vs Metacognitive	1.62	1,96	$p < .206$
Summaries, Headings, and Inferences vs Metacognitive + Examples	0.28	1,96	$p < .599$
Metacognitive vs Metacognitive + Examples	3.18	1,96	$p < .078$

Error Mean Square = 10.49

Table 12

Planned Comparisons of Treatment Groups' Posttest Scores

Treatment	ss	df	F value	Level of significance
Summaries, Headings, and Inferences vs Control	125.73	1	14.97	$p < .0002$
Metacognitive vs Control	77.45	1	9.22	$p < .003$
Metacognitive + Example vs Control	138.46	1	16.49	$p < .0001$
Summaries, Headings, and Inferences vs Metacognitive	7.53	1	.90	$p < .346$
Summaries, Headings, and Inferences vs Metacognitive + Examples	0.79	1	.09	$p < .760$
Metacognitive vs Metacognitive + Examples	12.56	1	1.50	$p < .224$

Error mean square = 8.39

Table 13

Effects of Covariates on Posttest Scores

Source	ss	df	ms	F value	Level of significance
Treatment groups	56.60	3	18.86	2.23	$p < .088$
Pretest	1076.28	1	1076.28	127.18	$p < .0001$
Vocabulary	40.47	1	40.47	4.78	$p < .031$
Comprehension	10.60	1	10.60	1.25	$p < .266$
TABE Total	0.05	1	0.055	0.01	$p < .936$
Error	778.58	92	8.46		
Corrected Total	1962.58	99			

Hence, the slopes of both covariates are parallel in all three treatment groups and the use of the ANCOVA is probably justified.

The results of the ANCOVA are shown in Table 6. Even when both covariates are considered in the analysis, the treatment is still significant ($F_{3,94}$ = 6.34, p < .0007). The means of the posttest scores for each group are shown after they have been adjusted for both covariates (see Table 7). The sequence of treatment effectiveness when unadjusted means are used (Metacognitive > Summaries, Headings, and Inferences > Metacognitive + Examples > Control) changes once the means have been adjusted for the covariates (Metacognitive + Examples > Summaries, Headings, and Inferences > Metacognitive > Control), but the Control Group mean still remains well below all of the experimental groups' means, which differ only slightly among themselves.

Pretest and posttest scores were correlated with the TABE vocabulary and comprehension scores of the participants (see Table 8) to determine the relationships between these two TABE Measures and the comprehension test we developed and used in this study. Participant scores on the comprehension measure used in Study Two were found to correlate somewhat more highly with scores from the comprehension portion of the TABE test ($r_{pretest}$ = .444; $r_{posttest}$ = .353) than with the vocabulary portion of the TABE test ($r_{pretest}$ = .357; $r_{posttest}$ = .128). These data indicate that all these tests are measuring different achievements, but that the gains probably were occurring in reading comprehension rather than in vocabulary or some other related reading ability or process.

Correlations between the pretest scores or the posttest scores and the number of generations constructed in the instruction (the workbook score) were also computed. The Metacognitive + Examples Group workbook

Table 14

Analysis of Covariance of Posttest Scores

with Pretest and Vocabulary Scores as Covariates

Source	ss	df	ms	F value	Level of significance
Treatment groups	159.65	3	53.22	6.34	$p < .0007$
Pretest	1047.66	1	1047.66	124.78	$p < .0001$
Vocabulary	40.47	1	40.47	4.82	$p < .030$
Error	789.24	94	8.40		
Adjusted Total	2037.02	99	20.57		

Table 15

Adjusted Means and Standard Errors for Posttest

Scores with Pretest and Vocabulary Scores as Covariates

Treatment	Adjusted		Unadjusted	
	Posttest Mean	Posttest Standard Error	Posttest Mean	Posttest Standard Error
Summaries, Headings, and Inferences Strategy (N = 29)	22.98	.539	22.59	.73
Metacognitive Strategy (N = 26)	22.24	.573	23.12	.82
Metacognitive + Examples Strategy (N = 29)	23.22	.548	22.07	.86
Control (N=16)	19.44	.736	20.81	1.34

Table 16

Correlations among Measures of Reading Ability Scores,

Pretest, and Posttest Scores; All Treatments Combined

| | TABE | | | | |
	Vocabulary	Comprehension	Total	Pretest	Posttest
Vocabulary	1.0	---	---	---	---
Comprehension	.462	1.0	---	---	---
TABE Total	.860	.819	1.0	---	---
Pretest	.357	.444	.445	1.0	---
Posttest	.128	.353	.255	.730	1.0

N=83

score correlated .32 and .37 with the pretest and posttest scores,
respectively. The comparable correlations for the Metacognitive Group
were .42 and .20, and for the Summaries, Headings, and Inferences Group
the correlations were near zero (-.12 and -.08). Apparently re'ations
more closely associated with comprehension were constructed in the two
Metacognitive Groups than in the Headings, Summaries, and Inferences
Group. Correlations between the pretest and the posttest were also
computed. They were .64, .69, .82, and .83 for the Summaries, Headings,
and Inferences Group, the Metacognitive Group, the Metacognitive +
Examples Group, and the Control Group, respectively.

An analysis of the means of the questionnaire items indicated
complex findings, still being explored, and difficult to summarize. Few
statistically significant mean differences occurred across groups. All
groups felt that the instructional materials were neither difficult nor
easy, but that the vocabulary of the reading passages was difficult.
The groups felt that they learned metaphors, analogies, hierarchies, and
images better than they learned main ideas and summaries. All groups
liked the instruction and the materials, as measured by their responses
to a questionnaire. On a scale of 1 to 5, with 5 indicating "liked very
much" and 1 indicating "disliked very much," the Summaries, Headings,
and Inferences Group, Metacognitive Group, and Metacognitive + Examples
Group means were 4.3, 4.2, and 4.1, respectively.

In sum, the results of the second study support the findings of the
first study, with the best treatment, the Metacognitive + Examples
Treatment, producing approximately a 23% gain in reading comprehension
after nine hours (450 minutes) of instruction. The results support the
findings of Study One in another way as well. The Summaries, Headings, and

Inferences Treatment, which was a revision of the Verbal Strategies Treatment of Study One, produced a posttest score of 22.6 and a gain of 20%. In Study One, the comparable Verbal Strategies Group produced a posttest score of 23.8 and a gain of 16%. The revised Verbal Strategies Treatment was included in Study Two because it was effective and well liked by the soldiers in Study One, and because it would provide a useful way to compare the effectiveness of the newly developed Meta-cognitive Treatments presented in Study Two.

These two Metacognitive Treatments contained elements that the soldiers found different and sometimes puzzling. They apparently were not accustomed to using learning strategies as they read, to being a reading manager, to generating relations between parts of the text, and to generating relations between the text and their knowledge. However, with these learning strategies, the soldiers in the experimental treat-ments sizably improved their reading comprehension, especially in the Metacognitive + Examples Treatment. In this treatment, the participants were required to generate and to write relations between knowledge, experience, and text. Their scores also improved, although we cannot be certain that the <u>written</u> generations mediated their improvement. From informal conversations with the BSEP teachers and with some of the participants, it is obvious that they find writing sentences to be difficult and time consuming. They are usually not proficient spellers or good at composition. As a result, the treatments might lead them to generate relations which they cannot or do not write. This possibility is only a hypothesis for future study.

Nonetheless, the implication is that asking poor writers to compose and <u>to write</u> relations is only one way to get them to generate meaning

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for text. We should try to find other, and perhaps better, ways to get active generation of meaning, such as by saying the words, or perhaps by use of constructed diagrams and simple pictures, such as were used in Study One with success. The generation of representations of relations between text and experience seems to be an important learning strategy in reading comprehension. The learners construction of overt representations of these relations is one effective but uncommon and somewhat difficult way to build them. Its effectiveness implies that the learners do not often spontaneously generate these relations and that instruction can and does facilitate their construction.

The most encouraging results of Study Two are that with another population of soldiers, this time at Schofield Barracks, analyses of gain scores within treatments, differences in mean posttest scores between all experimental groups and the control groups, including analyses of covariance, without exception indicated support for the model of generative learning, and for the finding that reading comprehension can be sizably increased in a relatively short period of time.

It is also encouraging to find that these effects occurred in realistic, actual classroom environments found at Schofield Barracks, with their population of Basic Skills Students learning with paper and pencil, and with inexpensive text materials. These learning effects occurred with materials that contained a high percentage of reading passages taken from Army manuals, along with a number of reading selections chosen from popular magazines and books. Although the expense, time, and problems of control of applied research are formidable and often lead to "no significant" results, the value of applied research

that does produce useful findings includes its utility and relevance to the societal and practical problem it addressed, in this case the improvement of reading comprehension among soldiers enrolled in BSEP classes taught on Army bases.

Study Three

In the Pilot Study, Study One, and Study Two our purpose was to write experimental and control learning strategy curricula to test the comparative effectiveness of generative processing of relations among the parts of the text and between the text and knowledge. In the Pilot Study, Study One, and Study Two we wrote and compared with one another a total of eight different sets of curriculum materials, totaling about 500 pages. Each curriculum represented a different learning strategy for improving reading comprehension.

In Study Three our major objective was not to compare different curricula and learning strategies with one another. Instead, our major objective was to prepare, revise, try-out, and evaluate, again in a realistic military teaching environment, a reading comprehension

curriculum developed especially for use in microcomputers. Based on our findings in the Pilot Study, Study One, and Study Two, we chose to develop for microcomputer use the Metacognitive + Examples curriculum. It was chosen because in Study Two it produced a high gain and was well liked by the soldiers.

Design. A one-treatment, pretest, instruction, and posttest design was used. Two samples of learners, one from Fort Ord and one from Fort Irwin, were involved in the study. As in the earlier studies, TABE (Test of Adult Basic Education) vocabulary, comprehension, and total reading scores were obtained for the learners.

Participants. A total of 41 participants were included in the original sample, 25 from Fort Ord and 16 from Fort Irwin. The sample from Fort Irwin represented a more advanced group of readers than did the sample from Fort Ord, a basic training base. To make the samples more comparable with each other, we deleted from the groups all soldiers with TABE scores at or above the 10th grade level or with pretest scores of 27 (75% correct) or better. As a result, data from 8 of the Fort Irwin soldiers and 3 of the Fort Ord soldiers were dropped from the study, leaving data from a total of 30 participants in the analyses.

Materials. Over a period of several months, averaging about 400 man hours per hour of curriculum materials, the text and the graphics needed to adapt the Metacognitive + Examples curriculum for a micro-computer, the Apple II+ or the Apple IIe, were prepared, revised, and put onto discs. The Apple Superpilot Authoring Program was used to prepare the materials and the discs.

In addition to the program, a 19-page Teacher's Manual was prepared to accompany the microcomputer-assisted instruction. This teacher's manual is also included in the appendices. The manual explains the basic principles of generative learning involved in the materials, the function of each of the nine daily exercises, and the use of a good summary. The Teacher's Manual presents a day-to-day procedure for the teacher to follow throughout the nine periods of instruction. Each reading passage is presented along with a summary of the learners' text, and with suggestions about teaching the points involved in each exercise.

Based on our work with marginally literate soldiers in the earlier studies of this project, we felt it critical that the soldiers engage daily in learning from a teacher as well as in daily group discussions. For this reason, each exercise begins with brief direct teaching of the principles to be learned that day or hour. Each exercise concludes with a brief group discussion and teacher summary of the points in the exercise. For further detail please see the Teacher's Manual in the appendices.

A Student Workbook, 11 pages long, was also prepared for use in class. The workbook includes spaces for the learners to write their summaries and related sentences evidencing the relations they constructed between the text and knowledge, and among the parts of the text.

Procedure. The author visited Fort Ord and Fort Irwin and demonstrated the microcomputer-based learning strategies curriculum to the Education Services Officers and to the BSEP Coordinators and teachers. At both bases, these people liked the materials and approved their use

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in their BSEP classes. To enable the Apple II+ microcomputers at these two bases to use the UCLA reading comprehension curriculum, the author purchased with project funds and installed at Fort Ord and Fort Irwin 16K memory cards in each of their machines. The reading comprehension curriculum requires 64K of memory. Without the memory boards the Apple II+ has only 48K of memory.

On the first day of instruction, each participant was given the pretest, which lasted 45 minutes. On subsequent days the nine instructional exercises were presented. On the last day of the study, the posttest was given, again with 45 minutes allotted for its completion, followed by 10 minutes to answer the questionnaire. The posttest, which was identical to the pretest, along with the questionnaire, appear in the appendices. Both of them are identical to the test and questionnaire used in the earlier studies in this series.

Results and discussion. Table 1 presents the mean pretest, post-test, and gain scores. The soldiers at Fort Irwin showed large gains, 4.2 points or 22% from the pretest score of 19.4 to the posttest score of 23.6. This statistically significant gain (p < .01) compares favorably with the gain shown in Study Two with the Metacognitive + Examples Strategy, which was approximately 23% at Schofield Barracks using written rather than microcomputer materials. However, at Fort Ord, the gain, although still statistically significant, was lower, 1.4 points, than was the gain at Fort Irwin. We do no know what produced these differences in gains at these two bases.

Table 2 presents the means and standard deviations of the TABE vocabulary, comprehension, and total reading scores of the soldiers at Fort Irwin and at Fort Ord. These means and standard deviations show

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Table 17

Means, Standard Deviations, and Gain Scores of the Experimental Groups

Army Base	Pretest	Posttest	Gain	t	Level of significance	% of gain over pretest
Fort Irwin	19.38	23.63	4.25	4.7	< .005	21.9%
(N=8)	(6.57)	(5.15)				
Fort Ord	19.36	20.77	1.41	2.2	< .025	6.8%
(N=22)	(3.46)	(2.83)				

Table 18

TABE Score Means and Standard Deviations of the

Experimental Groups Prior to Treatment

| | TABE SCORES | | |
Army Base	Vocabulary	Comprehension	Total Reading
Fort Irwin	7.7	7.8	7.7
(N=8)	(1.2)	(1.3)	(1.1)
Fort Ord	7.6	7.2	7.4
(N=22)	(1.1)	(1.1)	(0.8)

that the two groups of participants in this study were closely comparable to each other in each of the three measures of reading ability.

An analysis of the types of responses, verbatim versus relational, made on the worksheets during instruction, indicates that both groups made a preponderance of verbatim responses. They made few relational responses, which according to the model of generative learning are important for enhancing reading comprehension. This finding might explain the lowered gain in the Fort Ord group, but it does not explain the high gain in the Fort Irwin group.

The questionnaire data showed informative findings. Nearly all questions about the materials, the instruction, the vocabulary, the stories, and the reading skills (main idea, topic sentences, images, metaphors, hierarchies, order and sequence, and summaries) were answered more favorably by both the Fort Irwin and the Fort Ord populations than were answered favorably by the soldiers in Study Two at Schofield Barracks. On a scale of 1 to 5, with 1 being either "always easy," "always interest-ing," or "I learned all of it," and 5 being the opposite of "always difficult," etc., all group means for the Fort Ord group were between 1.3 and 2.2. The Fort Irwin group means ranged between 1.3 and 3.0, averaging about 1 point higher (less positive) than the Fort Ord group.

When asked about how well they learned metacognitive processes (e.g., learning to act as a reading manager), the Fort Ord group mean was 1.4 and the Fort Irwin mean was 1.3. Both groups felt they learned to manage reading quite well.

The ironic part of these ratings of the materials, the instruction, and their learning is that the group, Fort Irwin, that showed the greater gain also had the lower self-ratings and ratings of the materials.

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Feelings of success at learning and performances on posttests of comprehension were not always positively correlated with each other. Perhaps the learners at Fort Ord, who made many verbatim responses and still received immediate feedback from the microcomputer, avoided generating the relational responses but still felt that they were learning. Perhaps the novelty of the microcomputer produced a positive feeling about the instruction that influenced the ratings of the class. A difference in attitudes toward the teachers at these two Army bases might also have affected the ratings. In any case, the ratings seem to be measuring results other than learning to read with comprehension.

From the highly positive, unsolicited comments of the teachers and the students, especially at Fort Ord, it is clear to us that the microcomputer-based instruction was most well received, sustained interest over the two weeks of instruction, and was very well liked by the soldiers in it. The BSEP teacher at Fort Ord reported that several soldiers in the microcomputer class did not want to stop the instruction after the two hour classes were completed. They preferred to stay at the microcomputer to study reading rather than go to their next BSEP class. Perhaps it was the novelty of the microcomputer that produced this sustained interest at Fort Ord. However, the microcomputer-based curriculum at Fort Irwin produced a sizable gain in reading comprehension, nearly identical in size to that obtained with the comparable written materials used in Study Two with comparable ability BSEP students. But at Fort Irwin the soldiers' ratings of their learning were somewhat (about one point) lower than the ratings of the soldiers at Fort Ord.

One of the interesting and important findings comes from the record of time to learn maintained by the BSEP teacher at Fort Irwin. The average time in minutes per lesson required by the students in her class in Study Three are as follows, for lessons one through nine respectively: 29, 14, 26, 30, 41, 34, 19, 38, and 19. The total average time to learn the nine lessons was 250 minutes, or 4.16 hours. That is, the use of the microcomputer at Fort Irwin reduced the total time to learn from approximately 435 minutes in Study Two and 450 minutes in Study One (nine 50-minute hours) to 251 minutes, for a saving of 199 minutes or almost exactly four of the nine 50-minute class hours used in Study One. In percentage terms, the written materials curriculum added about 80% (199 ÷ 251) to the time needed by the microcomputer-assisted instruction to obtain the same gain in reading comprehension! Stated the other way around, the microcomputer-assisted instruction used only 55% of the time needed by the written materials to obtain the same gain, for a savings of 45%.

The microcomputer-assisted instruction also introduced major changes in the motivation of the learners, in the amount they learned, as well as in the time it took them to learn. The relations among these major changes are not yet well understood, nor are they always positive, as we found at Fort Ord where the gain scores were lower than those we obtained with written materials in Study Two. But from our study at Fort Ord and Fort Irwin, it is clear that over the short term, the microcomputer-assisted instruction enhanced motivation, interest, and perseverance. It is also clear that at Fort Irwin the microcomputer-assisted instruction can produce the large gains in comprehension occurring in Studies One and Two, and can greatly reduce the time needed

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to obtain the same sizable amount of gain shown in these two earlier studies.

These results have implications for classroom usage of micro-computer-based instruction. They also deserve further study.

One other finding, not apparent in the summary tables or the statistical reports, deserves mention. The gain scores of the learners in this study showed large individual differences. Some learners showed small or no gains in reading comprehension while other learners showed large gains in reading comprehension. The average gain score blurs these important individual differences in achievement that frequently occur in training studies such as this one. These individual differences in achievement deserve further study. No one method of instruction seems best for all students, who respond differently to different curricula and types of instruction.

In sum, in Study Three we found that the microcomputer-based reading comprehension curricula used by experienced and competent BSEP teachers also produced statistically significant gains in reading comprehension at both bases we studied, Fort Ord and Fort Irwin. The gain in reading comprehension was much larger at one Army base than at the other. In addition, the use of the microcomputer-based instruction, along with the BSEP teachers, reduced the time needed to learn by about 45%, from about nine class hours to about five class hours, which represents a consider-able savings of instructor and student time, as well as cost to the Army.

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Appendix A

READING COMPREHENSION EXAMINATION

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READING COMPREHENSION
EXAM

Directions: Read each story. Read and answer each question that
follows each of the stories. Choose the correct answer and mark the
spot on the answer sheet that corresponds to the answer you have
chosen.

A commercial fisherman in California now has one of the
flashiest boats on the sea. A judge ordered him to paint it a
bright color as part of a sentence for illegally taking 110
abalone off Saddle Point in Mendocino County. The 18-foot craft
had been painted battleship gray, a color that had enabled the
poacher to slip past wardens in fog or darkness.

Now the boat won't be so easy to hide; it's painted
international orange with red lightning bolts.

1. The judge ordered the abalone fisherman to paint his boat
    because--

    1. He felt that riding around in a bright-colored boat would
        be an embarrassing punishment.
    2. He knew that it would be hard for the man to avoid
        detection by law enforcement officers.
    3. The boat needed to be brightly painted to catch more
        abalone.
    4. Apparently, it's the law in Mendocino County that boats
        be brightly painted.

2. In this story, the word "poacher" means--

    1. A commercial fisherman.
    2. A sailor who can navigate in the fog and darkness.
    3. Someone who loves bright colors.
    4. Someone who fishes illegally.

What skill, or skills, did you use to answer the questions above?

_____

A-79

CHICAGO 16 -- There really is one good song on this album. Unfortunately, it's not the single, "Hard to Say I'm Sorry," which sounds like "If You Leave Me Now," "Baby, What A Big Surprise," "Just You and Me," and about 12 other Chicago songs we've all grown to hum and hate. No, the hot one is "Chains," a semi-tough un-horny song written by Ian Thomas who, it turns out, was not just a figment of Bod and Doug McKenzie's suds-soaked imagination. Everything else on the record is the usual Chicago air balls from the free-throw line; now that they've added no-longer-a-Son Bill Champlin to the fold, maybe they'll metamorphose into Illinois Speed Press before their twentieth birthday. Sleeve credits of the year--"Lyrical assistance on 'What Can I Say' by Dave Richardson." No songwriting royalties, mind you, but a nice thank you note is in the mail.

3. The record reviewer--
    1. Liked all the songs on the record.
    2. Liked none of the songs on this particular record.
    3. Liked one of the songs on this particular record.
    4. Doesn't care for the songs of Ian Thomas.

4. When the record reviewer doesn't like a song, he is likely to describe it as--

    1. Semi-tough and un-horny.
    2. An air ball from the free-throw line.
    3. A figment of the suds-soaked imagination.
    4. A hot one.

5. In the record review story--

    1. There is one main idea and a lesser idea.
    2. There are three main ideas.
    3. There are no main ideas in the story, but several minor ideas.
    4. There is a topic sentence, but no main idea.

What skill, or skills, did you use to answer the questions above?

_____

Two specifications you should know about before you purchase your large screen television are light output and viewing angle. The light output is measured in footlamberts. This spec isn't an indication of how much light the projector produces, but of how much light actually reaches you from the screen in a true room environment. As you might expect, the larger the screen, the smaller the footlambert figure. If you have to decide between two similar LSTs, choose the one with the higher footlambert rating. Most 4-foot units (50 inches) have a figure of 120 footlamberts. The 6-foot LSTs

range from 50 to 80 footlamberts. Believe it or not, this is quite bright; most screens in movie theatres reflect only about 14 to 16 footlamberts.

6. The main idea of this story--

   1. Concerns the importance of reflected brightness in a LST.
   2. Is the explanation of footlamberts and viewing angle.
   3. Centers on the differences between 4-foot and 6-foot LSTs.
   4. Is to get you to buy a LST.

7. A footlambert--

   1. Tells us how much light the projector actually produces.
   2. Is a way of comparing 4- and 6-foot LSTs.
   3. Is a measure of how much light actually gets reflected from the screen.
   4. Is a way of telling how large a screen may be when the specs aren't given.

8. In a hierarchy diagram, if we were to put the more important idea first, and the less important idea following it, which of the following would be correct?

   1. Movie theater screens reflect about 14 to 16 footlamberts...light output is measured in footlamberts.
   2. Four foot units usually reflect 120 footlamberts...you should make your decision based on light output and viewing angle.
   3. Light output is measured in footlamberts...light that actually reaches you from the screen.
   4. The larger the screen...has to do with light output and viewing angle.

What skill, or skills, did you use to answer the questions above?

_____

In the past 20 years, many pieces of equipment have helped baseball's superstars in the on-deck circle. Former catcher for the New York Yankees, Elston Howard, invented the leaded doughnut. Now a common feature in major league ball parks, the doughnut is a heavily weighted circle of metal that is slipped around the thicker end of the player's regular bat. A bat with the doughnut helps the player develop a powerful swing as well as a strengthened grip. By simply tapping the bat handle on the ground, the doughnut slips off, allowing the batter to use his regular bat at the plate.

9. Elston Howard was a catcher for the--

   1. Chicago White Sox.
   2. New York Yankees.
   3. St. Louis Cardinals.
   4. San Francisco Giants.

10. The doughnut in this story is helpful to the players because--

    1. Its added weight on the bat helps develop strength.
    2. It slips off easily when the player goes to the batter's box.
    3. The players can eat them if they get hungry.
    4. It usually results in the players' becoming superstars.

11. The inside radius of the leaded doughnut must be--

    1. At least as big as the large end of the bat.
    2. Smaller than the narrow end of the player's bat.
    3. Padded in order to protect the player's bat from knicks and scratches.
    4. Large enough to fit over the small end of the bat but small enough not to slip off the large end of the bat.

What skill, or skills, did you use to answer the questions above?

_____

On a bitter cold day in Winnipeg, November 14, Blue Bombers' quarterback Dieter Brock threw for 255 yards and two touchdowns as Winnipeg dominated Calgary, 24-3. The victory sends the Bombers to Edmonton November 21 for the Western Division showdown that will decide the division's Grey Cup representative. Both head coaches, Ray Jauch of Winnipeg and Hugh Campbell of Edmonton will leave the CFL for USFL coaching jobs after their final game. Winnipeg's placekicker, Revor Kennerd, accounted for 10 of the Bombers' points.

12. The coach of the Edmonton team is--

    1. Revor Kennerd
    2. Ray Jauch
    3. Dieter Brock
    4. Hugh Campbell

13. The main idea of the story is--

    1. Winnipeg defeated Calgary and now faces Edmonton in a playoff game.
    2. Ray Jauch and Hugh Campbell are more interested in playing in the USFL.
    3. Placekicking will play an important role in the final game between Calgary and Winnipeg.
    4. Touchdowns are easier to throw in cold weather than in warm weather.

14. According to the story--

   1. The winner of the Western Division wins the Grey Cup.
   2. The winner of the Western Division gets to play for the Grey Cup.
   3. Winnipeg won the Grey Cup and now plays for the Western Division Championship.
   4. The Grey Cup is an award that the winning coach from Calgary receives.

What skill, or skills, did you use to answer the questions above?

_____

   I came out of the Museum of Natural History and was crossing the street on my way to the subway, when I saw the crowd about halfway down the block; and the police cars, too. I could hear the whine of an ambulance. For a moment I was blinded by the reflection of the setting sun in the back of the police cars' windows.

   For a minute, I hesitated, but then I walked on. The crowds of curious just get in the way of officials trying to save lives. Dad, who's a detective on the force, complains about that all the time.

   I just kept my mind on the term paper I was going to have to write on air pollution for my class, and mentally arranged the notes I had taken during the museum program on the subject.

   Of course, I knew I would read about it in the afternoon papers. Besides, I would ask Dad about it after dinner. He sometimes talked about cases without telling too much of the real security details.

15. Which way was the young person looking when he looked toward the crowd on the street?

   1. North
   2. South
   3. East
   4. West

16. When the young person said that he would read about it in the afternoon papers, he was referring to...

   1. Air polution.
   2. The reason the crowd was on the street.
   3. The program that was going on at the Museum.
   4. The trouble that people cause when other people are trying to save lives.

Although tank crewmen are more likely to be injured when exposed, they prefer to keep hatches open and remain exposed until they come under fire because, when buttoned up, the crew must operate with increased visual deadspace. By taking advantage of this visual deadspacae, dismounted elements can approach and destroy a tank using numerous antitank devices.

17. When tank crewmen are exposed--

1. They are more likely to be injured.
2. The enemy is more likely to be hidden.
3. They are less likely to be seen by the enemy.
4. Dismounted elements can more easily destroy the tank.

18. In the story, the word "deadspace" means--

1. An area where there is no noise to be heard.
2. An area where the tank crew cannot see.
3. The extent to which the tank can destroy other enemy positions.
4. Parts of the inside of the tank that are not used for anything.

What skill, or skills, did you use to answer the questions above?

_____

She lay quietly in the dark attic, just barely able to see through a knothole in the floor. At first she saw a man's back as he built a fire in the fireplace. The wood smoldered and smoked for a time, and then he disappeared, probably into the kitchen, taking the lamp with him. After that there was only a slight glow from the fireplace, not even enough to warm the chimney. She could hear someone talking, but she couldn't make out what was being said. She shuddered and wished she had her warmer shawl. Her hands and feet were numb with cold.

It seemed long ago that she had looked out the kitchen window to see three strangers on horseback ride out of the woods. And now it was night, and they were down there, using the last of the precious coffee--she could smell the rich, warm smell--and probably starting on the ham which she had left out in plain view. She hadn't eaten since early morning, and then only a bit of bread, and she was beginning to feel lightheaded. She rolled back and forth against an upright post and tried again to work the rope loose from her wrists.

19. The best description of the attic is--

1. Cozy and warm.
2. Cold and dark.
3. Happy and peaceful
4. Big and empty.

20. Downstairs, the room below was--

1. Warm and comfortable
2. Loud, with talking and singing.
3. Filled with kindness and goodwill.
4. People telling "tall" stories.

What skill, or skills, did you use to answer the questions above?

_____

Fire distribution is the quickest and best way to get fire on all parts of a target. Fire must be distributed to keep all parts of the target under suppressive fire. Fire team leaders put fire on targets or target areas so that the enemy, whether visible or not, is kept under fire. A squad SOP may call for the left fire team to engage the left half of a linear target, or the front half of a column target. This makes sure that the whole target is engaged, not just those enemy soldiers nearest the squad firing.

21. Fire team leaders make sure that--

1. The enemy is kept under fire.
2. The troops around him are supplied with fire rounds.
3. Only part of the enemy troops are engaged by one squad.
4. Fire is distributed to linear targets.

22. In the story above, it would seem that "fire" means--

1. Disabling the enemy.
2. Shooting rounds of ammunition at the enemy.
3. Actually setting fire to the enemy troops.
4. Using artillery shells to engage the enemy.

23. The story above could be said to be a lot like--

1. Police chasing a speeder on the freeway.
2. A rough game of chess played by two championship players.
3. Taking the paper trash out to be burned
4. A hockey coach telling his players to keep shooting at the goalie.

What skill, or skills, did you use to answer the questions above?

_____

I had faith all along that Sugar Ray Leonard would make the right decision. No sane man risks his eyesight for money he does not need....As for doctors, or anyone else who would have you believe that a corrected detached retina can be "stronger" than it was originally, as was propagandized during Sugar's recovery period, I'd like other

damaged fighters to listen to Dr. Ferdie Pacheco. "When we operate to repair any tissue, we usually will be very happy if we can restore 75 percent of what God achieved originally," said the man known as the Boxing Doctor. "There is no such thing as making it better or stronger."

24. The best name for this story is--

　　1. Sugar Ray Hangs Up the Gloves--Wisely!
　　2. Boxers Don't Heal Well!
　　3. The Boxing Doctor Speaks
　　4. Boxing and Damage to the Eyes

25. Once tissue is damaged--

　　1. It generally heals by itself.
　　2. A doctor needs to treat it.
　　3. It never gets better or stronger than it was.
　　4. Usually an operation is necessary to make sure healing takes place.

What skill, or skills, did you use to answer the questions above?

　　　　Lisa opened her suitcase and began to put her belongings into drawers. She propped up last year's class picture beside her mirror and laid her diary beside her bed. She really should start to keep a diary, she thought with guilt. It had been a present from her best friend, Monica, back in Santa Ana.
　　　　She opened it and wrote:
　　　　September 1. We found a cottage today. It's called "Random." Dad says we've been living at random for weeks (joke). We're going to stay in one place now so I can go to school.
　　　　Lisa stopped writing and stared out of the window. School...How she dreaded the thought of going to a new school! She would have to wear some silly uniform, but that wasn't what worried her most. Suppose these English girls didn't like her? She had tried to tell her parents how she felt, but her mother had only said, "You'll make friends all right." And her father had added, "They'll be interested to meet someone new." But Lisa didn't think that was the way it worked out. She'd be new, and she'd be different.
　　　　She sighed, slammed the diary shut, and went down to see if her parents were ready to think about preparing supper.

26. Lisa is in--

　　1. The kitchen of the house.
　　2. A classroom.
　　3. Front of the TV set.
　　4. A bedroom.

27. The house is located--

 1. In Elizabeth's home town, Santa Ana.
 2. Someplace in England.
 3. A town called Random.
 4. Outside a town called Elizabeth.

28. The time of day is--

 1. Early morning.
 2. Late morning.
 3. The middle of the night.
 4. Late in the afternoon.

What skill, or skills, did you use to answer the questions above?

JACKSON, MI -- Rock'n'Roll's favorite infrahuman, cartoon caveman Ted Nugent, was hospitalized here recently after he took a header into a tree when his Ford Bronco snapped an axle. Reportedly terrible Ted was spending a pleasant summer afternoon running down chipmunks for sport when the accident occurred. Things looked touch and go for the beloved throwback briefly, as the hospital didn't have any of Nugent's rare 30.06-negative blood on hand, but a vulture who had flown into nearby Portage for the World Carnivore Freestyle Pro-Am Championship games, heard about Nugent's plight on a local TV broadcast, and rushed to the rugged woodsman's bedside to donate enough pints to bring the red-meat glow back to the Terrific Theo's cheeks. In the meantime, there were unconfirmed reports that the Detroit Free Press had received a call from a "Rabbit Liberation Front" spokesrodent who claimed responsibility for Nugent's crash and who promised further vengeance in defending small, furry animals' rights to self-determination. Nugent is reportedly sleeping with a loaded bow and arrow beside his pillow from now on.

29. Ted Nugent was injured because--

 1. His car was sabotaged by a rodent.
 2. He shouldn't have been competing in the Pro-Am.
 3. He crashed into a tree.
 4. He was involved in a fight.

30. In this story, the word "throwback" probably means--

 1. a reference to a caveman.
 2. a musician.
 3. someone who likes to destroy small animals.
 4. someone who has been in an automobile accident.

31. The main idea of this story is--

    1. A stranger donated blood to save Ted Nugent's life.
    2. Ted Nugent intends to defend himself with a bow and
       arrow.
    3. Ted can't stand chipmunks and kills them when he can.
    4. Ted was hospitalized after his Ford broke an axle and
       crashed.

What skill, or skills, did you use to answer the questions above?

_____

        The T-10 heavy tank is rarely seen in Threat forward areas.
The tank stays in the rear and is used in counterattacks or with tank
killer units. It is equipped with infrared sights or devices for all
crewmembers, and has seven pairs of roadwheels.Its primary weapon is a
122-mm stabilized gun firing kinetic energy armor-piercing cap and
chemical energy high explosive antitank ammunition. It has two
12.7-mm machineguns, one for antiaircraft and another mounted
coaxially with the main gun. The strengths of these main battle tanks
are: a) low silhouette, which makes them harder to hit; b) simple
fire control, which makes them easier to operate and maintain; c)
infrared night vision devices, which increase effectiveness at night;
d) underwater snorkeling, which permits them to cross water barriers
quickly; and e) the high-velocity 115-mm APFSDS tank-defeating round,
which travels a mile every second. The accuracy of this round gives
T-10 tank crews a 50% chance of hitting a stationary target traveling
at a constant speed in the open at ranges to 1,000 meters.

    32. A Threat forward area is probably--

        1. The area where the opposing forces come face to face.
        2. The front part of the tank.
        3. Along the borders of the enemy country.
        4. The area on the outskirts of Threat.

    33. Altogether, the T-10 tank has--

        1. 1 gun.
        2. 2 guns.
        3. 3 guns.
        4. 4 guns.

        When a runner threatens to steal a base, every player on the
field must move. Second basemen and shortstops converge to cover the
bag. Outfielders think about having to back up throws. Catchers
start to rise out of their crouches. Pitchers hurry throws to the
plate. "Speed causes a lot of things to happen," explains veteran
manager Dick Williams. Other teams have to pitch out more. The
batter gets ahead on the count. We get more fastballs to hit."

The perfect stolen base results from a fine blend of speed and concentration. Speed enables the runner to get to second bse quickly, and concentration on the jump is the secret to stealing bases. Timing the jump off first is something that begins before the game actually starts. Mookie Wilson of the New York Mets discusses pickoff moves and catchers' arms with the players and coaches before the game. During the game, the study continues.

"While the game is going on, I check out the pitchers from the dugout. Certain pitchers will change their delivery according to who's on first base. Of all the pitchers I've run against, I guess that Steve Carlton of the Phillies is the toughest. Carlton has the same move whether he's throwing to first or home."

34. For the story above, the statement that best states the main idea would be--

    1. When a runner threatens to steal a base, every player must move.
    2. The perfect stolen base results from a fine blend of speed and concentration.
    3. Base-stealing demands speed and concentration from the runner and also causes all of the fielders to move.
    4. Pitchers change their deliveries depending on the batter and the man at first base.

35. Only one of the statements below is correct. Circle the answer that is correct.

    1. Steve Carlton is the toughest... His move to first is the same as his move to third.
    2. When a runner threatens to steal a base...the batter has to move out of the way.
    3. Speed and concentration... Dick Williams of the Mets has the most.
    4. Timing a jump off of first...starts even before the game begins.

36. "When a runner threatens to steal a base..." might be compared to--

    1. An automobile accident caused by a drunken driver.
    2. A group of firemen trying to put out a fire.
    3. A group of carpenters trying to finish a house before the deadline listed in the contract.
    4. A reaction by the military to an alien plane flying dangerously close to our borders.

What skill, or skills, did you use to answer the questions above?

_____

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Appendix B

QUESTIONNAIRE

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NAME: _____ Social Security # _____

     In this questionnaire we would like to know how you felt about different parts of the reading comprehension material that you used during the past two weeks. Please fill in the appropriate responses where they are asked for.

1. I felt that the materials were... (Circle the answer you feel is appropriate)

1	2	3	4	5
All of it was easy	Most of it was easy	About half and half	Most of it was hard	All of it was hard

2. In the instructional part of the booklet, where the different skills were presented, I feel that I...

1	2	3	4	5
Understood all of it	Understood most of it	Understood about half	Understood a little	Didn't Understand any of it

3. The vocabulary in the booklet was...

1	2	3	4	5
Always easy enough	Most was easy	Understood about half	Most of it was too hard	Always too hard

4. The stories in the booklet were...

1	2	3	4	5
Always interesting	Mostly interesting	Some good some not	Most were uninteresting	All of them were uninteresting

5. You are asked here to tell how well you feel you learned each of the sections. Please show how well by circling the number you feel best tells how well you learned.

	Learned all of it	Learned most of it	Did OK, but still a lot to learn	Learned a little	Didn't learn much at all
Getting the Main Idea	1	2	3	4	5
Topic sentences	1	2	3	4	5
Images	1	2	3	4	5
Metaphor & Analogy	1	2	3	4	5
Hierarchies	1	2	3	4	5
Order and Sequence	1	2	3	4	5
Summaries	1	2	3	4	5
Acting as a Reading Manager	1	2	3	4	5

6. In your booklet did you feel that there was...

   1--Just enough to read,   2--Too much to read,   3--Not enough to read
   1--Just enough writing,   2--Too much writing,   3--Not enough writing

7. After completing the booklet do you feel your reading skills are...
   1--much better, 2--a little better, 3--unchanged, 4--a little poorer,
   5--much poorer

8. We really need your help on this question. If you could make changes in the booklet, what would you change and why?

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

9. What did you find most helpful in the booklet and why?

   _____

   _____

   _____

   _____

10. Was it easy for you to follow the instructions in your booklet? What things did you find difficult?

    _____

    _____

    _____

TEACHER'S MANUAL

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**************************************
*            UCLA - GSE              *
*                                    *
*      READING COMPREHENSION         *
*          ENHANCEMENT               *
*            PROGRAM                 *
*            + + +                   *
*        TEACHER'S MANUAL            *
*                                    *
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1984

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OVERVIEW

The nine lessons of this CAI format reading comprehension program were designed as an aid to the reading instruction curricula currently in use in Army BSEP classrooms. Research has demonstrated that readers frequently find it difficult to construct meaning from what they have read. In addition to the problems that already face readers in BSEP programs, such as vocabulary and grammar, these learners frequently have also failed to incorporate efficient and effective comprehension strategies in their repertoire. This program attempts to instruct these learners in a few simple, but potentially powerful, comprehension strategies that can be used in various types of reading tasks.

ACTIVE CONSTRUCTION OF MEANING

In recent years, the study of learning has taken educational psychology beyond the simplistic approaches of behavioristic psychological answers to effective classroom instruction. In light of recent findings, the learner has once again emerged as an active participant in the learning process. In other words, it is crucial to establish active (rather than passive) learning and problem-solving strategies and techniques as part of the learner's repertoire. This is especially true with reading strategies. Learner's must be encouraged to actively elaborate and expand on reading content. In so doing, the learner calls into action higher order thinking and, therefore, is more likely to understand and remember what he or she has read. Some reading researchers have stated that it is more important for readers to be taught to ask the "right" questions, rather than find the "right" answers. The strategies that are taught in this nine lesson approach attempt to do just that. We are instructing learners to ask a series of questions, which they then answer, in order to construct meaning from what they read. The learners are encouraged to use the meanings they garner from the relationships that exist between different words in the text, and also to use relationships that they identify between the readings and the knowledge of their own past experience.

SUMMARIES, INFERENCES, AND DECISIONS

The most important facet of the reading strategies instruction in the nine lessons is the generation of summaries. Summary construction is taught as a series of component strategies--Who, What Happened, and Why questions. In addition, the reader is taught to examine the reading for additional characteristics such as identifying the reading as important for job training or enjoyment reading.

The "Who (or What)" question centers on the identification of the main idea in a paragraph or story. The reader is taught

to identify the main idea through the use of topic sentences and, in the absence of topic sentences, a self-generated "umbrella" idea--an idea that encompasses the main idea, or ideas, in a reading.

The "What Happened" strategy acquaints the learner with a method of identifying the important parts of a reading. The learner is taught to identify the parts of the reading that contribute significantly to the main idea. In the case of technical or job-related readings the learner is taught to pay attention to correct order and sequence.

The "Why" question asks the learner to make inferences about the reading. The learner's judgment is important here as the lessons encourage learners to design answers based on a variety of possibilities including why the author thought it important that the reader should know what is included in the reading. The key here is to encourage the reader to elaborate on the material in the reading. This additional "processing" on the part of the reader is likely to increase comprehension and recall.

EXERCISES

Learners are encouraged throughout the nine lessons to practice the skills with provided readings. In many instances learners are asked to generate answers on the worksheets to questions that are designed to test knowledge of the skills. These worksheet answers will be most helpful to the teacher in that they will provide 1) an estimate of how well students are grasping the skills instruction, and 2) they will provide an important environment in which teachers can provide crucial feedback to students on their progress.

This teacher's guide is designed to acquaint teachers with the basic principles that students will be working with in the lessons. In addition, the teacher's guide affords the teacher some possible guidelines for eliciting responses from students concerning the instruction in the lessons and the exercises, many of which call for responses from students on worksheet forms. Learner's responses to these exercises will provide teachers with valuable feedback regarding learners' successes and/or failures in achieving a command of the skills.

The student worksheets must be collected at the end of Lesson 9. These worksheets will provide evaluators necessary information regarding the effectiveness of the lessons. Teachers are encouraged to go through the lessons themselves on a computer if time and resources allow. We have tried to provide sufficient information in the Teacher's Manual to make the conduct of the follow up sessions fruitful, but those instructors who will participate in the program will find it much more enlightening to go through the same lessons that learners will participate in. We would appreciate any and all feedback that you can afford us after participating in the program. THANKS!

LESSON 1

THE READER IS A BUILDER

The introductory lesson attempts to acquaint the learner with the idea of reading as a "building" process. The learner is presented with an analogy of building and reading as an activity of putting things together to form a whole (or meaning, as in reading). In order to show the reader how he or she "builds" an idea, four words are presented and the learner must construct an idea around the four words (WARM RADIO BEACH BIKINI). With this exercise the learner is introduced to the idea of INFERENCE. The learner's mind must INFER the rest of the idea in order to pull the four words together in a unified thought. The most important part of inference is that the learner must come to understand that his or her own past experience is crucial in constructing meaning for what is read. Learners are instructed to mention something from their own past experience when they are presented with the exercise question-- "Give an example!" The mental elaboration that the learner performs when required to search his or her own past experience for something similar helps the comprehension process. Frequently, the learner can figure out more of what a reading means when they take the time to relate as much of the reading as possible to their own past experience.

Exercise 1

Students are asked to put 7 words together in one idea on the worksheet. The words are--AIRLINER STEWARDESS STORM COFFEE PILOT NIGHT HONOLULU. If students seem puzzled about the concept of INFER it might be wise to review the answers that they have recorded on the answer sheets. Emphasize the idea that the mind builds meaning and that good readers must be able to build meaning from what they read.

Teachers may want to expand on the meaning building by giving students a word, or words, and having them build a sentence or series of sentences from those words. Another possible use of this technique would be to select a reading for students to read or listen to and then reflect on how they built meaning from their own past experience of key words in the reading. Research has shown that even a knowledge of the process of how comprehension is achieved can serve to improve readers comprehension proficiency.

LESSON 2

THE THREE STEPS OF A GOOD SUMMARY

In this lesson learners are introduced to the three basic questions that they must answer to create a good summary--Who (or What) is the reading about? What happens in the reading? Why does it happen?

Learners are presented with the analogy scoring in a baseball game. Each of the bases represents one of the question facets of a good summary. When the summary is complete, the reader "scores!" Learners are also encouraged to generate answers for the questions in their OWN WORDS. This is important for many deficient readers to do because it demands a deeper level of processing on their part than simple copying of answers.

The lesson then proceeds to an explanation of the "Who (or What)" question. Learners are instructed that they can often determine the answer to the "Who (or What)" question by looking at the title of a reading, or, for a paragraph, the topic sentence. We have told the learners in the program that the topic sentence is <u>usually</u> the first sentence in a paragraph. We have further elaborated that the topic sentence will tell the reader what will be talked about or explained in the paragraph.

Class Work

It would be best if the teacher pursued the concept of topic sentences in group work. A series of paragraphs could be selected from class readings that learners could work with in attempting to identify topic sentences. The teacher could also explain that sometimes topic sentences are weak and need more work on the part of the reader to pull the ideas of the paragraph together. (Lesson 3 will teach learners how to construct an "umbrella" idea to act as a topic sentence for readings that do not have good topic sentences.)

LESSON 3

"MAKING AN UMBRELLA"

Lesson 3 teaches additional processes of identifying or creating an answer for the "Who (or What)" question. Learners are instructed in creating an "umbrella" that is explained as " a way of saying that you have to find a term or phrase that can answer the Who or What question so that all the topics covered in the reading 'fit' under your umbrella." Learners are then shown how a good topic sentence acts as an umbrella to cover the ideas in a paragraph. Specifically, the topic sentence is shown as a general idea that is elaborated on by the other ideas in the paragraph. Where a good topic sentence is not included in a paragraph or reading, learners are encouraged to create an "umbrella" idea to provide an answer to the WHO or WHAT question.

Exercises

In this lesson the learners are given a reading about Portland, Maine. They are told 1)to find the topic sentence and then 2)create an umbrella idea for the whole reading. The reading appears below:

READING 3-E

The waves crashing against a rocky beach, wilderness adventures calling from the distance, seafood dinners that are out of this world, and New England charm all add up to the wonderful city of Portland. This area attracts many tourists, and for good reason. The beautiful Casco Bay has many islands, and the fishing and sailing boats add to the ocean scenery. It is an old city, with fine historic sites and well-preserved homes. It is a place that seems as though it were designed for walking along the lovely streets and looking in pretty shops and art galleries. The University of Maine has a campus here.

The first sentence is the topic sentence, but students should create an umbrella idea that encompasses the whole reading. This idea should be brief and quite general, e.g., "Portland, Maine--a city of many attractions." (Students will be taught that details--such as "The University of Maine has a campus here"--will be included in the answers to the "What happened?" question.

Learners are then given a technical reading--from an Army publication--and asked to again find a)the topic sentence, and 2)to create an umbrella idea for the reading. The reading is as follows:

READING 3-F

Visual communication is a means available to all units. Visual signals are transmitted by flags, lights, pyrotechnics

*(like flares), panels, arm-and-hand signals, and other methods.
They are OK for transmitting prearranged messages rapidly over
short distances, as well as for recognition and ID of friendly
forces.*

After learners record their answers to the topic sentence
and umbrella creation questions, the program presents the learner
with four options for an umbrella idea:

A. *Flares and panels are forms of visual communication.*
B. *Short distances are best for visual communication.*
C. *Visual communications--types and usage.*
D. *Visual communications are best for friendly unit
identification.*

The correct answer is C because it is broad enough to
include ALL of the ideas in the paragraph. Compare learners'
responses to this answer to see if any misconceptions with the
umbrella idea still exist. If so, try to demonstrate to learners
that they umbrella idea must encompass all of the ideas in the
reading--ESPECIALLY when the TOPIC SENTENCE does NOT!

LESSON 4

YOU'RE ON THE WAY TO SECOND BASE!

In this lesson, learners are introduced to the "What Happened?" question. Learners are told that answering the What Happened question becomes easy if they have located a good topic sentence and/or created a good umbrella idea to answer the Who or What question. Two simple rules are presented--1)You must already know Who or What the reading is about, and 2)You must figure out What Happens to them or it. Learners are told that when they read technical readings--especially job training materials like Army manuals--they must pay attention to details for answering the What Happened question. The What Happened answer is usually the MOST IMPORTANT part of the summary.

Learners are then introduced to a second facet of the What Happened question--How to decide which things that happened in the reading are important for the summary, and what can be excluded from the summary. Reading for enjoyment often includes a great deal that can be deleted from a summary--it is a judgment call for the reader to make. On the other hand, technical or job-related reading is usually parsimonious in style and contains much that should be referred to in a good summary. Learners are instructed that reading for enjoyment does not often necessitate elaborate summaries since the reader is not required to remember many details. Learners are instructed that technical readings require much attention to detail (and order and sequence) and summaries must include ALL important details.

Exercises

The first exercise that learners encounter asks them to answer the Who or What question, then answer the What Happened question for the following reading...

READING 4-A

The day was warm and the sun was high in the sky. Jim's mother had just died and he was lost in his thoughts. He had never tole her how much he really loved her and now she was gone. The tobins kept flying around him looking for worms. Jim felt like getting drunk. He didn't know any other way to deal with his sadness. The little gountain in the park was broken and the still water at the bottom was green. Jim didn't see any of it-- he just kept walking--to nowhere.

Check to see if students accomplished the task correctly. We gave an example of an answer for the What Happened question and deleted most of the imagery details that the author had included. Students should see that these details are not important for remembering the main idea in the paragraph.

The second exercise uses a reading from the Soldier's Manual

that describes the use of the Dragon portable missile. Again, students are instructed to answer the Who or What and What Happened questions, though the answer to the Who or What question is given in the program--The Dragon. The answer to the What Happened question should include ALL relevant details about the construction and use of the Dragon.

READING 4-B

The Dragon is a command-to-line-of-sight guided missile system that is a man-portable, shoulder-fired, medium anti-tank weapon (MAW). The missile is launched from a smooth bore, fiberglass tube, recoilless launcher. It is automatically and continously guided along the runner's line of sight by a sensor device which tracks the missile's course and transmits correcting via a wire link. The Dragon has two major components--the tracker and the round. The round is the expendable part of the system and has two important parts, the launcher and the missile. These are packaged together at the factory for handling and shipping. The launcher serves as the handling and carrying container and the tube for firing the missile. The tracker is the reusable part of the system. It is designed for fast, easy detachment from the round.

Check students' answers for inclusion of ALL details in the reading.

The third exercise on the answer sheet asks students to answer the Who or What and What Happened questions for the following reading...

READING 4-D

When a person is choking, there are certain things that you should know how to do. Make sure, whether the person is sitting or standing, that you are behind them. Wrap your arms around the person's waist under his arms. Make a fist with one hand and put it on the person's stomach just below the ribs and above the navel. Grab your fist with your other hand. Press your fist into the person's stomach, with a forceful, fast, upward thrust. Allow the person time to inhale in order to get air in the lungs. Repeat the process until the person can breathe normally again.

This is a technical reading of a little different nature than the "Dragon" reading, but complete attention should be paid to every detail and the CORRECT SEQUENCE in which those details appear. Make sure, at the end of this lesson, that learners understand the difference between enjoyment reading and technical or job-related reading summaries.

LESSON 5

HOW TO GET TO THIRD BASE

Lesson 5 deals with INFERENCE. The learner is taught to answer the third of the three basic questions in a summary--the WHY question. This is a difficult part of the summary building because for any given reading there are many possible ways to go to answer the WHY question. We have given the reader the latitude to answer the WHY question in just about any way they want. The important thing is to encourage the learner to think about questions that may have come to mind while reading, or to develop questions about the reading once completing it. The answer can be as simple as developing an answer for "Why did the author want me to know this?" or as complex as developing questions that search for underlying assumptions and reasons-- like one would do in reading a mystery story.

By the end of Lesson 5 students have been introduced to the three basic questions of summary building. They should use all three of these questions from this point onward to construct summaries for their reading.

Exercises

The practice readings in Lesson 5 afford the learner more exposure to various types of readings and provide more practice for the WHO or WHAT, and WHAT HAPPENED questions. In addition, learners are encouraged to use the last of the three basic questions--the WHY question. Several of the practice readings in this lesson are accompanied by answers to the questions within the context of the program. Two of the practice readings, however, are not. We think it will be important for the teachers to use these two readings in follow-up discussions to see how proficiently learners are performing using the questions to build their summaries. We believe it can be helpful to have learners pool their answers to try to reach some form of concensus on answers to each of the three questions.

READING 5-A

Here are some ways that you can reduce the effects of jet lag. On your flight, drink a lot of water to overcome the chance of your body drying out because of the dry air from the cabin air conditioning. Do not drink beer, hard liquor, or wine. Don't ea⁺ very much, even though you are served a big meal. Wear loose clcthing and dress comfortably. Even though you are in your seat, try to exercise your arms and legs as much as possible.

The answer provided told learners that reducing jet lag was the most appropriate answer to the "WHY" question. Make sure to emphasize that the topic sentence often provides the most logical answer to the "WHY" question.

READING 5-C

To cross roads, trails, or small streams, select a point at or near a bend in the road or stream--if possible, a bend that has concealment and cover on both sides. Crawl up to the edge of the open area and observe the other side carefully before crossing. Cross rapidly but quietly. Get down on the other side. Check the area around you.

Work with the WHY question after the above reading. Try to mold the thinking of the readers in such a way as to demonstrate the importance of the above instructions and WHY they have to know them.

READING 5-D

If you visit Munich, the best way to try the beer is to visit a beer hall. One of the most famous beer halls is the Hofbrauhaus (pronounced like "Hoff-brow-house"). Guess what kind of beer they serve? Hofbrau, naturally. Beer halls, like the Hofbrauhaus, are very different from American bars. They have several floors, like a department store, to drink on. Usually the ground floor has the cheapest prices (and the most drunks). As you go up, the floors get nicer (and more costly) and become more like a restaurant.
The best way to see the whole place is to start at the top and work your way down. That way, if you do have too much to drink, by the time you hit the bottom floor, all you have to do is stumble out the door. You won't have to risk falling down the steps!

Emphasize the use of the three basic questions again with this reading. It might be fun here to get participants reactions to the WHY question!

READING 5-E

No matter what position you use (standing, kneeling, prone) when throwing a hand grenade, you should be as comfortable and natural as possible. The two most important points in accurate throwing are body-target alignment and eye-target focus. Line up your body with the target as though you were going to throw a football or baseball. Keep watching the target as you throw, and let your arm swing naturally to it. Follow through with your throwing motion and take cover. If possible, you or a buddy should watch where the grenade lands. Make sure you properly aim the grenade before you throw it. The safety pin and clip should be removed while behind cover.

Besides the three basic questions, make sure that learners pay attention to the correct sequence of how things are supposed to happen when throwing a hand grenade. The answers that they developed for the WHAT HAPPENED question should reflect the correct order for this procedure.

LESSON 6

RULES FOR GOOD SUMMARIES

Lesson 6 instructs learners in three additional rules for generating a good summary...

1. DECISION WHETHER SUMMARY SHOULD BE <u>SHORT</u> or <u>LONG</u>--learners learn to make judgments based on reading for enjoyment or job-related readings. The rule of thumb is that technical types of readings will require detailed (and, therefore, LONG) summaries. Reading for enjoyment, on the other hand, usually requires only a little summarization--sometimes only a collection of answers for the WHO or WHAT question from each of the paragraphs in the story.

2. PUTTING SUMMARIES IN OWN WORDS--learner's are told that the extra thinking they do to put the answers to the three questions in their own words helps them to both remember and understand what they have read.

3. PUTTING THINGS IN THE RIGHT ORDER--especially important for technical types of readings, learners are instructed in answering the WHAT HAPPENED part of their summaries for job-related readings in correct sequence. For some readings of this nature, this procedure is less important. Where sequence is important--like a repair or life-saving procedure--learners are encouraged to include all details in correct order. Correct application of this procedure is a judgment call--learners should be made aware of how important it is to think about their answer before writing it down.

The end of the lesson includes a number of review questions for learners to consider. It would be wise to sample responses from the group to see if the concepts are clear. If not, going over practice readings from this lesson may help clarify any problems that still exist. (Questions appear at end of this lesson summary.)

Exercises

The first exercise asks learners to write a short summary for each main idea in an enjoyment reading. The reading is as follows...

READING 6-A

When the word "fastball" is mentioned in the American League, one name immediately comes to mind--Rich "Goose" Gossage. He has been called the most intimidating player in major league baseball. At 6 feet 2 inches and 217 pounds, the Goose throws a

*fastball that has been clocked at 98 miles per hour. when
Gossage delivers, the ball flies our of a mass of arms and legs
that all seem to be rushing towards the batter.*

*"He can make that ball look so small that you're not even
sure there's a practical reason for being up there," said John
Lowenstein of the Baltimore Orioles. "The Goose gets ready in a
hurry," says Dom Scala. "He knows what he has to do. If it's
the eighth or ninth inning, and we're up by a run or two, the
"Goose" knows he's going to pitch. We'll throw the ball around
until he's loose. Then he'll get on the practice mound, air out
a few, and he's ready.*

*The fans don't totally get to hear the effect the ball makes
as it hits my glove. In spring training down in Florida, the
stands are just a few feet away from the bullpen area. When
Gossage warms up, the fans line the fence, and you should see the
look on their faces when they hear how loudly the ball snaps into
my glove!"*

Stress the idea that enjoyment reading is best done with short
summaries that capture the main idea of each paragraph.

Check to see that students are answering questions in their
own words. Tell them again to avoid copying verbatim answers.

Below are the questions that students are given to review at
the end of Lesson 6. Go over each of them with the class to make
sure that they understand what they are to do.

IS THE READING IMPORTANT, OR JUST FOR ENJOYMENT?

DO I KNOW HOW TO FIND AND USE TOPIC SENTENCES?

WHAT ABOUT MAKING AN "UMBRELLA" FOR THE MAIN IDEA?

DO I KNOW WHAT AN INFERENCE IS? HOW DO I USE INFERENCES?

SHOULD MY SUMMARY BE SHORT OR LONG? HOW DO I DECIDE?

WHAT SHOULD I USE WHEN I MAKE UP A SHORT SUMMARY?

WHAT CAN I DO WHEN THE READING IS VERY LONG?

WHY DO I PUT THINGS IN MY OWN WORDS?

WHY DO I HAVE TO BE CAREFUL WITH JOB-RELATED READINGS?

WHY IS CORRECT ORDER SO IMPORTANT IN SOME READINGS?

WHEN I THINK OF QUESTIONS AS I READ, DO THEY HELP?

DO I UNDERSTAND WHAT I READ, AND AM I USING THE SKILLS?

It may be useful to apply examples while having the class discuss
the questions above.

LESSON 7

THIS LESSON SHOULD BRING YOU HOME!

Lesson 7 introduces a fourth question--HOW?--to the learners. This question is not a part of the summary building, but rather a skill to help readers relate and construct meanings between parts of text. This cognitive skill is designed to increase thinking in the learner.

In order to master the HOW question, the reader learns that there are inter-connected meanings in readings between THINGS (nouns), ACTIONS (verbs), QUALITIES (adjectives and adverbs), and RELATIONSHIPS (prepositions). The learner is told to concentrate on the parts of the reading that he or she ALREADY KNOWS something about. Using that knowledge, the learner is then instructed to generate meaning for those parts of the reading (in most cases an unfamiliar word) that are unclear. This practice does not always insure that the reader will create a correct meaning for the unknown word--and learners are cautioned about this--but it does provide an exercise that enhances learners' comprehension.

Learners are given a simple strategy for identifying what THINGS (nouns) they know and don't know from a reading. Learners are told to list on one side the words they know something about already, and then told to list the words they don't know anything about on the other side. From the list, they are then told to try and construct meaning for the words they don't know using the word meanings that they do know.

Exercises

The first exercise asks students to read a passage about rock music. A nonsense word is included in this passage and students are told to construct a meaning for the word from the rest of the meaning in the passage.

READING 7-A

The rock band came on stage while the roar of the crowd shook the whole building. The lead singer grabbed the mike off the stand and started singing the group's biggest hit--"Hot Lunch." The drummer started his solo part with a driving beat on the bass drum. The solo ended with a crash of the frip.

Check to see if learners created a meaning for FRIP that would be logical considering the other cues in the reading. We told them in the program that a FRIP may be like a cymbal. Emphasize to students that this same mental activity helps them construct meaning while they read.

The next exercise asks learners to list the THINGS (nouns) they know and don't know. They are given a reading about driving

a race car. The reading has several words that are specific to competition racing. Some of the students will probably know these words which can help in the discussion about the reading. Those that did not know all of the meanings can see how close they came to generating a definition that fits the words that they did not know.

READING 7-B

I got in, struggling again with the high side bars on the roll cage. Several laps later I began to pick up the pace. There was serious understeer and a bump in the side of the bucket seat that hit my arm just wrong. Then, in the twisting back section of the track, while shifting up to 3rd, I got 1st!

I went into a big spin off of the track, but fortunately got only minor damage to the front spoiler. Good grief, how awful. "Big Time Professional Race Driver Hits Wrong Gear--Dings Car." I could hear Paul Miller on the phone already. "Akin, what did you do to my car?"

The next exercise included a short reading about an expensive brand of men's suits--the Brioni. We asked the learner to try and figure out what a Brioni was from the following reading...

READING 7-C

The peerless Brioni is handmade in the ancient town of Penne, near Italy's Adriatic Coast, in a factory where artisans of a dying craft sew over 65,000 stitches into a single garment, working eighteen hours on each one.

We told them that it may be easy to construct a meaning for the Brioni that was wrong--a dress! That's OK, though, because they still used the cues correctly that were available.

We have not included the HOW question as part of summary building simply because the added question can confound the simplicity of the design. Students should be aware, however, that this is an activity that any good reader uses to help construct meaning for a reading.

LESSON 8

READERS HAVE TO PRACTICE!

Lesson 8 is a practice lesson. Learners are given a variety of readings and told to use specific skills with each of those readings. It is important to check that learners have acquired the use of the three basic questions--WHO or WHAT, WHAT HAPPENED, and WHY. We recommend having learners compare their answers in group fashion after they have gone through the programmed part of Lesson 8.

Exercises

In reading 8-A we asked learners to do two specific things, besides answering the three basic questions--1)create an umbrella idea for the reading to answer the WHO or WHAT question, and 2)to identify whether or not the reading was a technical type of reading.

READING 8-A

Washington--Congressional officials are expected to approve a plan to allow commercial travel services to operate in military exchanges. Proposals to allow the exchange services to permit civilian medical, dental, and legal clinics to operate as concessions in exchanges are under study. If adopted, the concession operations could mean more convenience and lower prices for exchange shoppers.

In reading 8-B--a reading that tells about the "first" restaurants--we have asked the learner to practice the HOW question by listing any nouns that they don't know. Most will understand the entire reading, but some may have difficulty with the following words--"cookshop", and "eatery". They also may not understand the older meaning of tavern (like an inn). Learners are also expected to answer the three basic questions for this reading.

READING 8-B

The restaurant as we know it today is less than 200 years old! Until the 1700's, people who wanted to eat out went to a tavern, where only one dish was offered each day--and only men were allowed. Or they went to a cookshop--where meat was cooked--and brought home a take-out dinner. The first real restaurant offering a menu with a choice of dishes opened in Paris, France, in 1765. A sign outside this eatery said "Restaurants" which is French for "to restore." They used this sign because of the healthy soups and broths served there. The word "restaurant" became, before long, the name of an eating place in almost every country in Europe.

Reading 8-C is a technical reading from the Soldier's Manual. Learners should develop answers for all three of the basic questions, but the WHAT HAPPENED answers that learners record on the worksheet should include all important details. In this reading, correct order was not particularly important. Lesson 9 will present learners with a technical reading that necessitates recording the correct order for doing something.

READING 8-C

Cover is any type of shielding from the effects of weapons fire, especially direct fire. You must take advantage of every ravine or depression in the ground to protect and cover your force, especially if you are forward of the forward edge of the battle area. You must evaluate the land around you, the power of the enemy's weapons, and the positions of known and suspected enemy placements. To determine the cover, visualize a cross-section of the terrain and determine where the enemy cannot place effective direct fire on your proposed route of movement.

In Reading 8-D, learners read another technical type of reading. Besides the three basic questions, we asked learners to tell us two things after answering the basic questions--1)What skills did you use for understanding the reading?, and, 2)Did you understand the reading? We are trying to make the learners conscious of using the skills--to begin to ask themselves questions about using the skills and to understand what helps them with their reading.

READING 8-D

There are several weaknesses of threat main battle tanks. Threat tank fighting compartments are considerably smaller than those in US tanks. The crew is cramped and freedom to move around is restricted. Crew fatigue can therefore be a bigger factor in threat tanks. Smaller turret interior and larger (115mm) main gun ammunition means that threat tanks have a slower rate of fire than US tanks.
Because of its small fighting compartment, the T-62 tank has 23 fewer rounds of ammunition than the M60A1. Therefore, in tank duels, threat tanks may run out of ammunition before the US tanks. Some main gun ammunition is strapped along the turret walls, and hits above the turret ring may cause secondary ammunition explosions.

Make sure that learners have identified the topic sentence in the first paragraph as the main idea. Second, the WHAT HAPPENED answers should include all important details.

LESSON 9

THE 9TH INNING!

The teacher's feedback for Lesson 9 is most important. In this lesson we have asked learners to develop summaries for the readings without the aid of any prompting. We have also asked them a few questions in the program about the use of the skills. The teacher should attempt to work with students that still seem to be having problems with the summary building. This set of readings will enable the teacher to go over all of the important parts of summary building that have been part of previous lessons.

The first two readings in Lesson 9 were accompanied by a series of questions that are designed to help learners assess the correct use of the skills. Readings 9-C, and 9-D are also accompanied by questions but require learners to generate answers to the three basic questions before they match their application of the skills to what the program tells them. Both Reading 9-C and 9-D are technical readings, but only 9-D explains a procedure that should be followed in exact order. Look for this in learner responses on the worksheet. This is the kind of reading that they will be doing for most job-related training programs, whether they are in the Army or not.

READING 9-C

The SQT has three parts: Written, Hands-On, and Performance Certification. Sixty to ninety days before the SQT is given, an SQT notice will be sent to each unit. It will tell which tasks will be tested in each part of the SQT. It will also tell how the task will be tested. There are three different ways to test a task. First, you may be asked to answer a written question about how a task is performed. You will pick the correct answer from a list of answers and mark the correct answer on a machine-scoreable answer sheet. Second, you may be asked to actually do the task. For example, you may be given an M72A2 LAW and be asked to prepare it for firing. This is called a hands-on test which means you are actually required to do the task as you would on the job. Third, the unit commander may observe your performance of a task and report your ability to perform it as part of your SQT score. Your performance on all three parts of the test will be reported to you sometime after you complete the SQT. You will be told which tasks you did not perform well. you can use your soldier's manual to improve your performance in those areas.

Check to make sure that learners have included all important details in the reading as part of the "What Happened" question answer.

Heat stroke is a dangerous thing. The signs of heat stroke are a stoppage of sweating (hot, dry skin). The person may collapse and pass out suddenly, or it may be preceded by headache, dizziness, fast pulse, nausea, vomiting, and mental confusion. You should quickly immerse the person in the coldest water available. If you can find some, add ice to the water. If you cannot find ice, immerse the person in the water, get him into the shade, remove his clothing, keep his entire body wet by pouring water over him, and fan his wet body continuously. Get the person to the nearest medical facility as soon as possible, cooling his body on the way. If the person is conscious, give him cool salt water prepared as per instructions for "heat cramps."

After reviewing answers to the three basic questions for Reading 9-D, ask students to discuss any problem areas that they still may not understand. These procedures are designed to assist learners in comprehending what they read. You can explain to them at this point that if they continue to practice the procedures, they will become proficient at using them. Once they gain proficiency, they will be able to use the skills most of the time without having to write out answers.

PLEASE COLLECT STUDENT WORKSHEETS AT END OF THIS CLASS.